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Water Resources Data for Michigan Water Year 1981

(U.S.) Geological Survey
Lansing, MI

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U.S. Department of Commerce
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U.S. DEPARTMENT OF THE INTERIOR
March 3, 1849

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

Water Resources Data Michigan
Water Year 1981

U.S.GEOLOGICAL SURVEY WATER-DATA REPORT MI-81-1
Prepared in cooperation with the State of Michigan
and with other agencies

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U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

CALENDAR FOR WATER YEAR 1981

1980

OCTOBER

S	M	T	W	T	F	S
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1981

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SEPTEMBER

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U.S. Department of the Interior
March 3 1849

State of Michigan Department of Natural Resources

Water Resources Data Michigan

Water Year 1981

U.S.GEOLOGICAL SURVEY WATER-DATA REPORT MI-81-1
Prepared in cooperation with the State of Michigan
and with other agencies

I

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For information on the water program in Michigan write to
District Chief, Water Resources Division
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, Michigan 48910

1982

PREFACE

This report was prepared by personnel of the Michigan district of the Water Resources Division of the U.S. Geological Survey under the supervision of T. R. Cummings, District Chief, and J. E. Biesecker, Regional Hydrologist, Northeastern Region. It was done in cooperation with other agencies.

This report is one of a series issued by State. General direction for the series is by Philip Cohen, Chief Hydrologist, U.S. Geological Survey, and Robert J. Dingman, Assistant Chief Hydrologist for Scienfitic Publications and Data Management.

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Water resources data for the 1981 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. This report contains discharge records for 178 gaging stations; stage only records for 4 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 45 continuous-record stations; and water levels for 53 observation wells. Also included are 85 crest-stage partial-record stations and 59 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan.

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c. COSATI Field/Group

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[Letter after station name designates type of data: (d) discharge, (c) chemical, (b) biological, (g) gage height, (m) microbiological, (p) pesticide, (r) radio-chemical, (t) water temperature, (s) sediment]

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WATER RESOURCES DATA FOR MICHIGAN, 1981

INTRODUCTION

Water resources data for the 1981 water year for Michigan consist of records of stage, discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground-water wells. This volume contains records for water discharge at 178 gaging stations; stage only at 4 gaging stations; stage and contents at 5 lakes and reservoirs; water quality at 45 gaging stations; and water levels at 53 observation wells. Locations of these sites are shown on figures 4-9. Also included are data for 85 crest-stage partial-record stations and 59 low-flow partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

Records of discharge and stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, "Ground Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

For water years 1961 through 1974, streamflow data was released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1981 have been released by the Geological Survey in annual reports on a State-boundary basis.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published in official Survey reports on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-81-1." For archiving and general distribution, the reports for water years 1971-74 are also identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone, 517-377-1608.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, H. A. Tanner, director, through Water Management Division, L. N. Witte, chief, and Geological Survey Division, A. E. Slaughter, chief, succeeded by T. R. Segall.

State Department of State Highways, J. P. Woodford, director.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 33 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, Soil Conservation Service, U.S. Department of Agriculture, Environmental Protection Agency, and the National Park Service.

The following organizations aided in collecting records:

Dickinson County Road Commission; Kalamazoo County Board of Supervisors; Macomb County Board of Supervisors; Oakland County Department of Public Works; Oakland County Drain Commission; Genesee County Drain Commission; Van Buren County; Huron-Clinton Metropolitan Authority; Ypsilanti Community Utilities Authority; Cities of Ann Arbor, Battle Creek, Coldwater, Imlay City, Ironwood, Jackson, Kalamazoo, Lansing, Portage, and Ypsilanti; Allied Paper Inc.; American Aggregate Corp.; Consumers Power Co.; Cleveland-Cliffs Iron Co.; Detroit Edison Co.; Fisher Body Division of General Motors Corp.; Hanna Mining Co.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Michigan Power Co.

Organizations that supplied data are acknowledged in station descriptions.

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SUMMARY OF HYDROLOGIC CONDITIONS

In the Upper Peninsula, streamflow during the 1981 water year was above median for the fourth consecutive year. February, March, and April runoff was excessive due to an early melting of the snow mantle, which began with a heavy thaw in mid-February. The resultant higher flows continued into March and April, sustained by intermittent high temperatures and moderate rainfall in April. The maximum daily and mean monthly flows in February were record high at the index station Sturgeon River near Sidnaw. Runoff during the remaining months was in the normal range, except for September, which was deficient due to below normal precipitation.

The northern part of the Lower Peninsula experienced normal runoff for 10 of the 12 months at the index station Muskegon River at Evart. The mid-February thaw also caused excessive runoff, with the monthly mean the fourth highest in 49 years of record. An extended dry period caused runoff to be deficient in June.

Runoff in the southern part of the Lower Peninsula was variable throughout the year; excessive in October, February, and September; deficient in March and July; and normal in the remaining months. September was an extremely wet month in southern Michigan. Heavy rain on the 3rd and 4th caused flash flooding on many small streams. During the next several days, serious flooding occurred in the River Raisin basin with the greatest damage near Blissfield and Dundee. Discharge reached a new maximum, 14,500 cubic feet per second, at gaging station River Raisin near Monroe, on September 6.

Precipitation was heavier during the evening of September 30 over an area 30 to 40 miles wide, extending from Kent County to the northern suburbs of Detroit. Flash flooding caused considerable damage to property and to crops. Mainstream flooding on the St. Joseph, Grand, Clinton, Huron, and Rouge Rivers followed during the first days of October.

In figure 1, the monthly and annual mean discharge is compared with the median discharge during 1951-80 at the three index stations.

Ground-water levels in the Upper Peninsula were normal in the west half, but ranged from above normal in October to below normal in September in the east half. In the northern part of the Lower Peninsula, levels were in the normal range. In the southern part, levels were above normal in the southwest and below normal in the southeast.

In 1981, dissolved-solids concentration as recorded by Michigan's NASQAN stations, changed noticeably from those during 1976-80. In the Upper Peninsula, samples from the Escanaba River at Cornell contained increased concentrations of dissolved solids. Sodium significantly increased, with less noticeable increases in chloride and sulfate. In the Lower Peninsula, the Clinton River at Mt. Clemens, and the River Raisin near Monroe both continued the slight decreases in dissolved-solids concentration observed in the 1980 water year. The St. Joseph River near Niles also had lower dissolved-solids concentration than observed in previous years, whereas the Pigeon River at Caseville increased notably in dissolved solids. No residues of pesticides or PCB's were found nor were abnormally high concentrations of trace metals present. Occasional high values for iron and manganese were found but are not unusual in Michigan.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the table for converting English units to International Systen of Units (SI) on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micromgrams per liter of the original water sample.

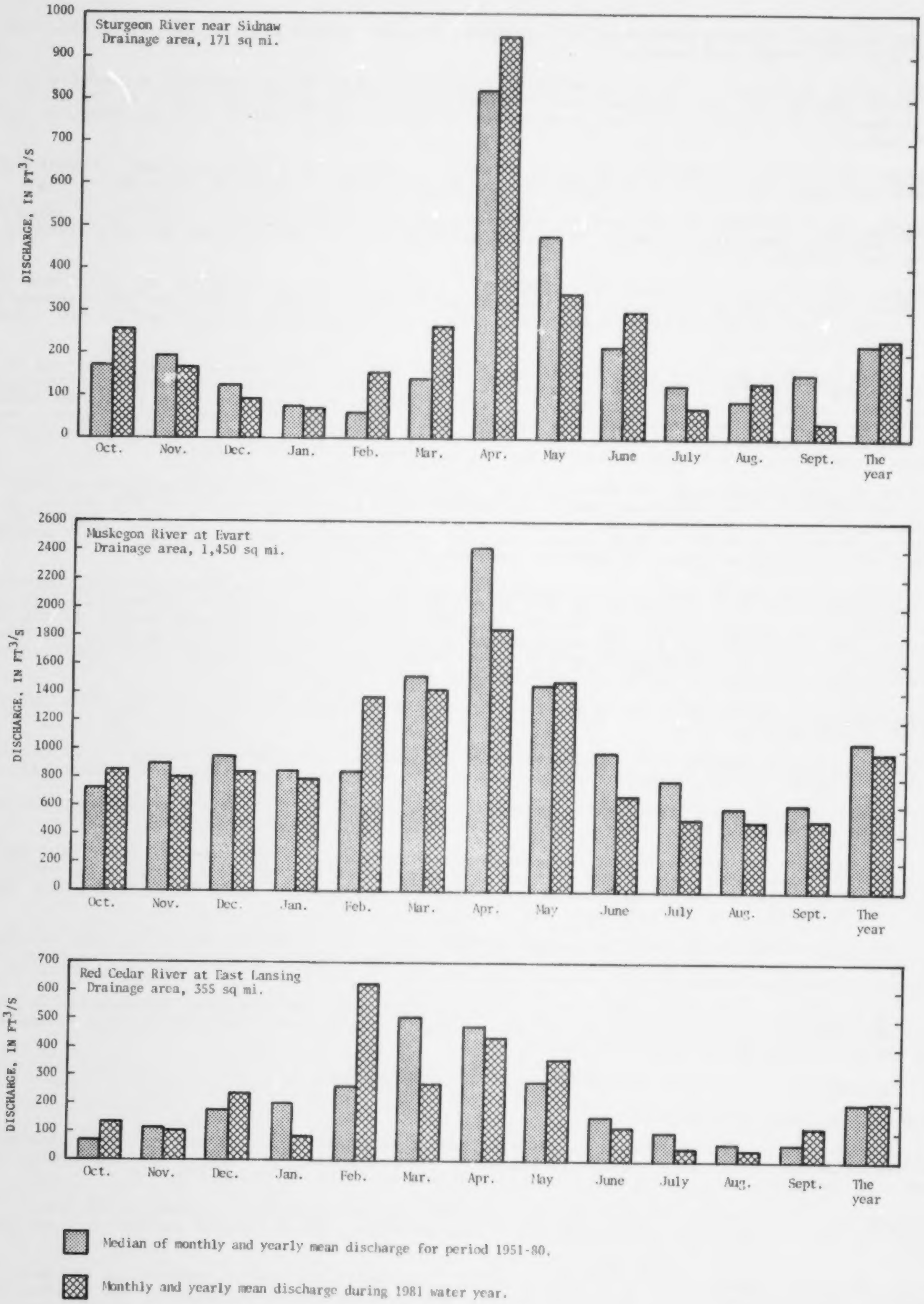

Figure 1. Discharge during 1981 water year compared with median discharge for period 1951-80 for three representative stations.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer, tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies within 24 hours when incubated at 35°C ± 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C ± 1.0°C on M-enterrococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area of volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT^3/s, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (coloidal) suspended particles. Analyses are performed on filtered samples.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i=1}^{s} \frac{ni}{n} \log_2 \frac{ni}{n}$$

Where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontribution areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkalined earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle-size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analyses
Clay	0.00024 - 0.004	Sedimentation
Silt	.004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC, pCi) is one trillionth (1×10^{12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radio activity that yields 3.7×10^{10} radio active disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [mg $C/(m^2 \cdot time)$] for periphyton and macrophytes and [mg $C/(m^3 \cdot time)$] for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [mg $O_2/(m^2 \cdot time)$] for periphyton and macrophytes and [mg $O_2/(m^3 \cdot time)$] for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom	Animal
Phylum	Arthropoda
Class	Insecta
Order	Ephemeroptera
Family	Ephemeridae
Genus	Hexageria
Species	Hexagenia limbata

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary that enters between two main-stream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indention in a list of stations in the front of the report. Each indention represents one rank. This downstream order and system of indention show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 04058500, which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility, latitude and longitude numbers are determined to seconds. The first six digits denote degrees, minutes, and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last two numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.

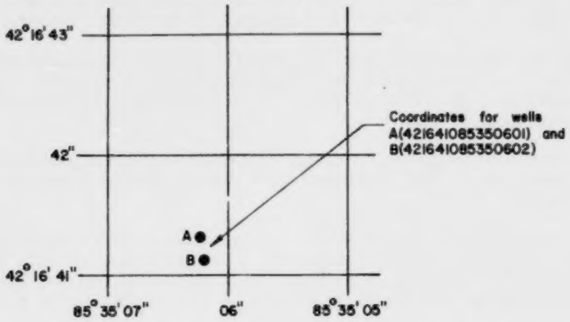

Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter deesignations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

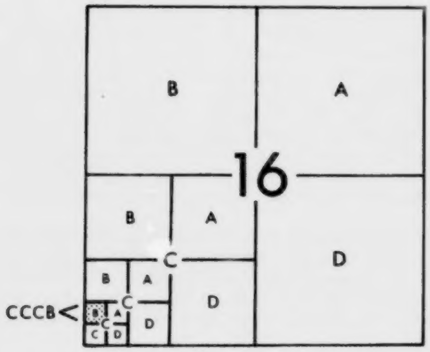

Figure 3. Well numbering system in Michigan.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designed by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning and management. Both accounting and broad-scale monitoring objectives have been incorporated in the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF STAGE AND WATER-DISCHARGE

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard textbooks, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologist, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year which begins on October 1 and ends on September 30.

The description of the gaging stations gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD."

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water year Oct.1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS" on page 5.

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS." For reservoir stations information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir is given under "REMARKS."

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations peak discharges are listed with "EXTREMES FOR THE CURRENT YEAR"; if they are, all independent peaks, including the maximum for the year, above the selected base with the time of occurrence and corresponding gage heights are published in tabular format. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for most reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

Accuracy of data

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other data available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the district office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

EXPLANATION OF WATER QUALITY RECORDS

Collection and examination of data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature, sediment discharge, etc.); extremes for period of daily record; extremes for the current year; and general remarks.

Information pertaining to the accuracy of some water-quality records are preceeded by a "remark code." The following are explanations of "remark codes" found accompanying water-quality records: "E" estimated; "K" results based on colony outside the acceptable range (NON-IDEAL COLONY COUNT); "ND" not detected.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and/or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water analysis

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the district office.

Water temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small daily temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

Only ground-water level data from a basic national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) that the most significant data are obtained from the fewest wells in the most important aquifers.

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude, and (2) a local number that is provided for local needs. See figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of different temperatures, hence neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will insure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the lands-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (eom).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

Thirty-four manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) is on surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises. The reports listed below are for sale by the U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. *Water temperature--influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W. W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

2-D1. *Application of surface geophysics to ground-water investigations*, by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.

2-E1. *Application of borehole geophysics to water-resources investigations*, by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.

3-A1. *General field and office procedures for indirect discharge measurements*, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.

3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M. A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.

3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.

3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.

3-A6. *General procedure for gaging streams*, by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.

3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.

3-A8. *Discharge measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.

3-A11. *Measurement of discharge by moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.

3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.

3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.

3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

4-A1. *Some statistical tools in hydrology*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.

4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.

4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.

4-B3. *Regional analyses of streamflow characteristics*, by H. C. Riggs USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.

4-D1. *Computation of rate and volume of stream depletion by wells*, by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 pages.

5-A2. *Determination of minor elements in water by emission spectroscopy*, by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.

5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.

5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages.

5-A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L. L. Thatcher, V. J. Janzer, and K. W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.

5-C1. *Laboratory theory and methods for sediment analysis*, by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.

7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L. F. Konikow and J. D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.

8-A1. *Methods of measuring water levels in deep wells*, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.

8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

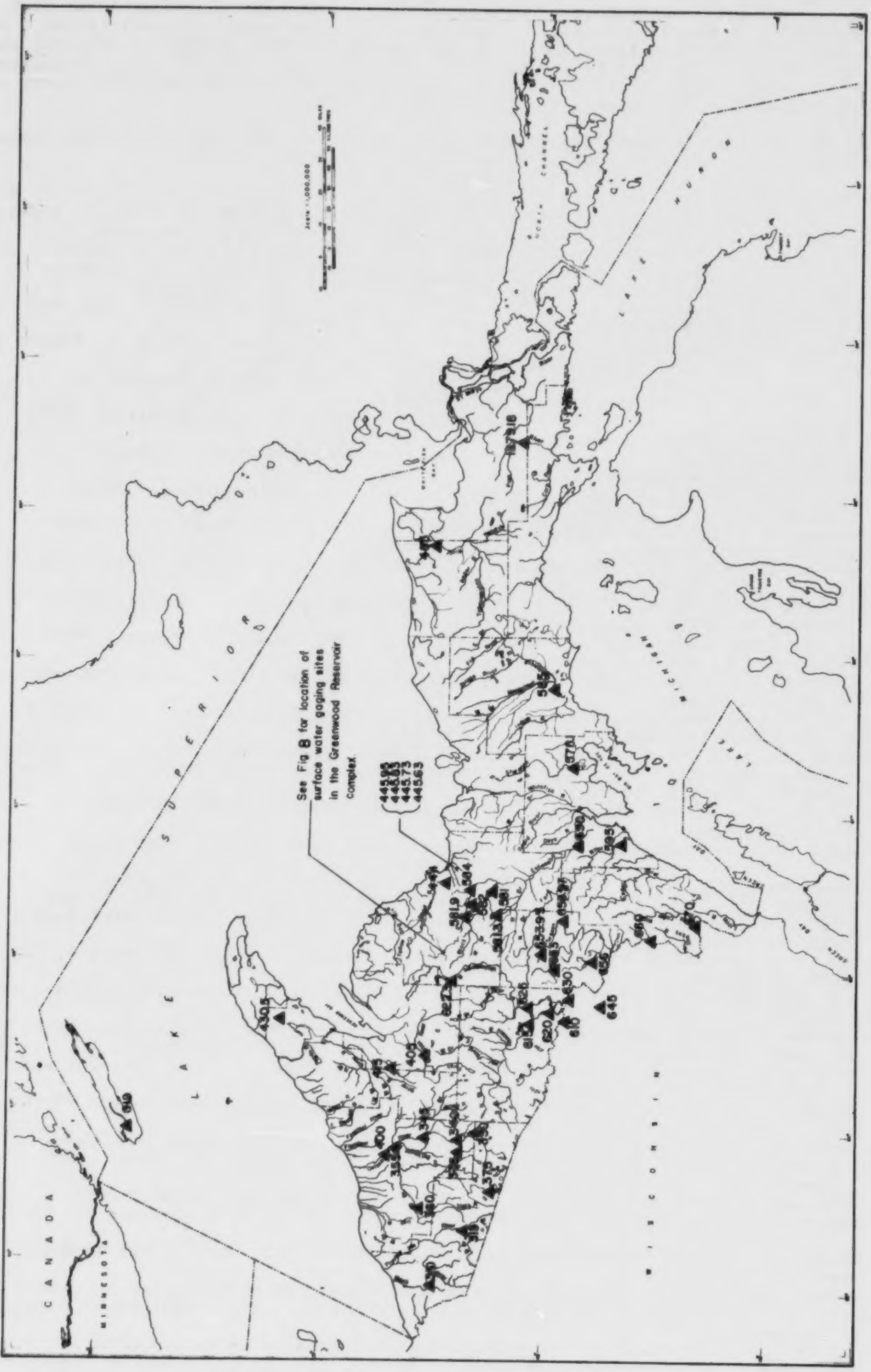
CANADA
MINNESOTA
LAKE SUPERIOR
WISCONSIN
LAKE MICHIGAN
LAKE HURON
NORTH CHANNEL
See Fig 8 for location of surface water gaging sites in the Greenwood Reservoir complex.
44595
44585
44573
44563
4305
403

FIGURE 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan.

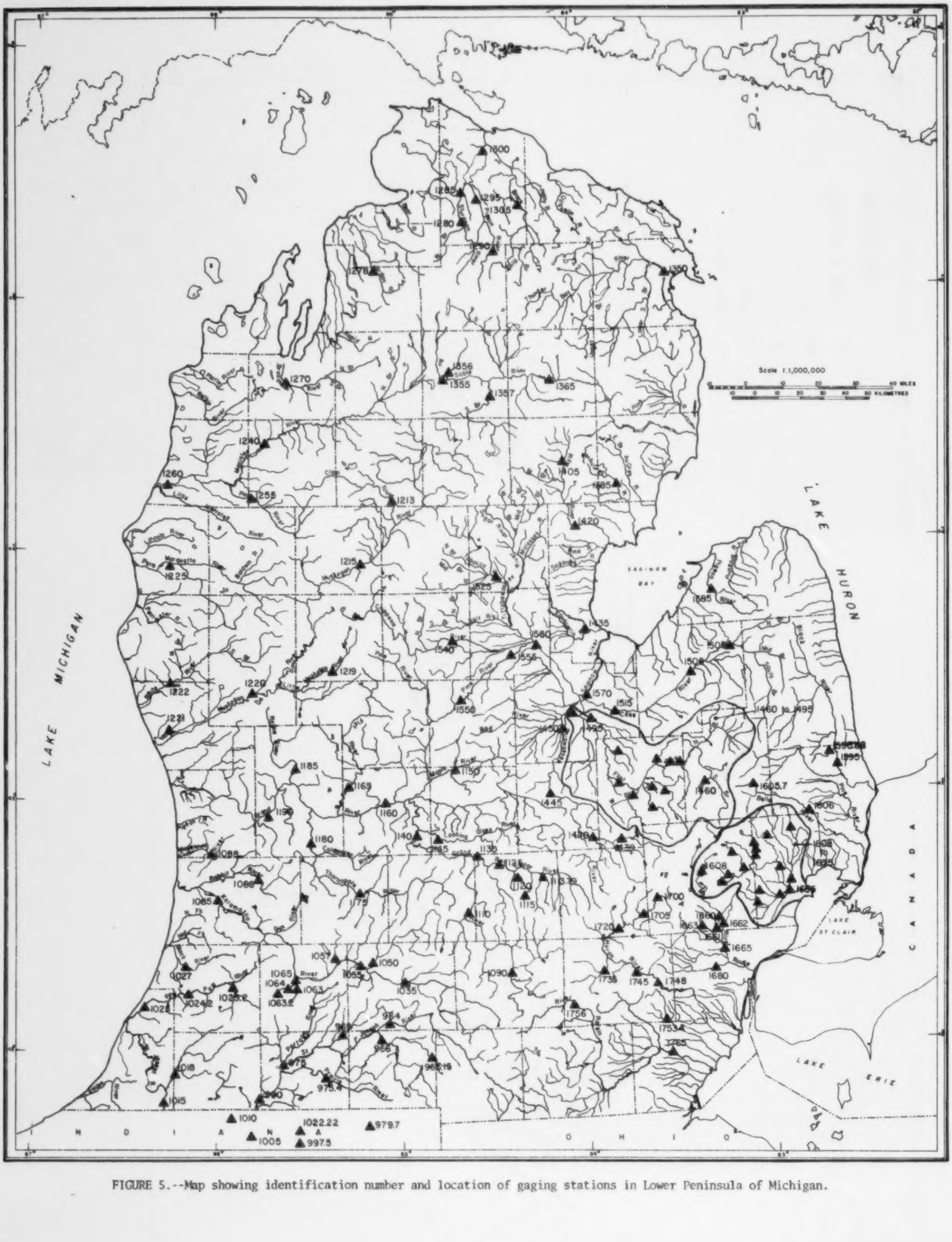
Scale 1:1,000,000
LAKE MICHIGAN
LAKE HURON
SAGINAW BAY
LAKE ST CLAIR
LAKE ERIE
CANADA
INDIANA
OHIO
1300
1285
1295
1305
1280
1275
1350
1356
1355
1357
1365
1270
1240
1260
1255
1213
1405
1385
1420
1215
1225
1525
1435
1585
1560
1540
1555
1505
1500
1219
1220
1222
1221
1570
1515
1550
1460 to 1495
1450
1425
1596
1595
1185
1165
1150
1160
1445
1605.7
1460
1606
1180
1140
1135
1130
1125
1120
1115
1436
1439
1608
1099
1086
1085
1175
1110
1700
1705
1720
1660
1662
1665
1057
1050
1065
1064
1063
1055
1035
1090
1735
1745
1748
1680
1027
1024.2
1025
1756
1753
1765
964
966
975.4
1018
1015
1010
1005
1022.22
997.5
979.7
Ohio
Huron
Erie

FIGURE 5.--Map showing identification number and location of gaging stations in Lower Peninsula of Michigan.

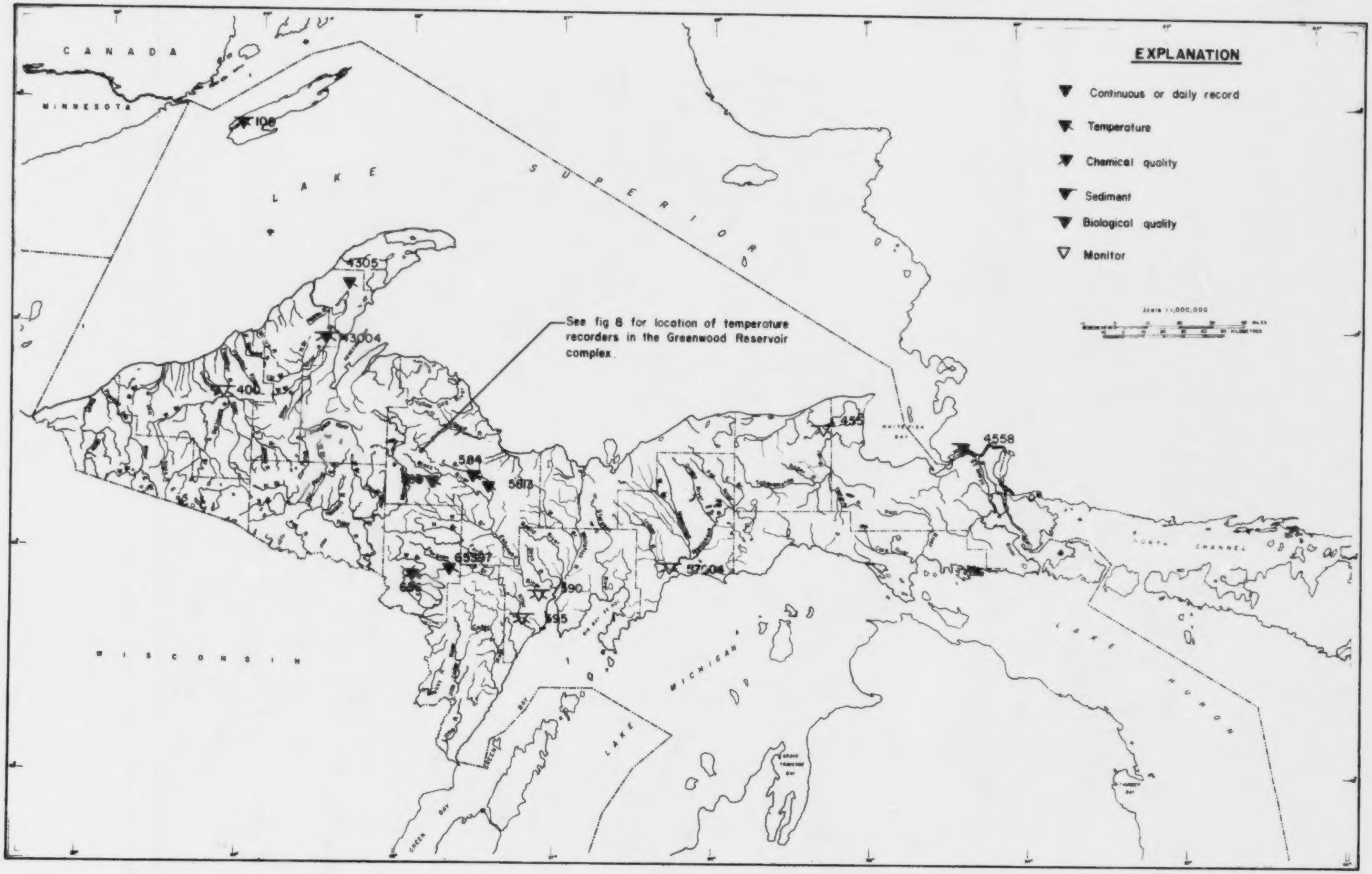
EXPLANATION
Continuous or daily record
Temperature
Chemical quality
Sediment
Biological quality
Monitor
Scale 1:1,000,000
CANADA
MINNESOTA
WISCONSIN
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
NORTH CHANNEL
GREEN BAY
108
4305
3004
400
584
5813
65397
390
395
57204
455
4558
See fig 8 for location of temperature recorders in the Greenwood Reservoir complex.

FIGURE 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan.

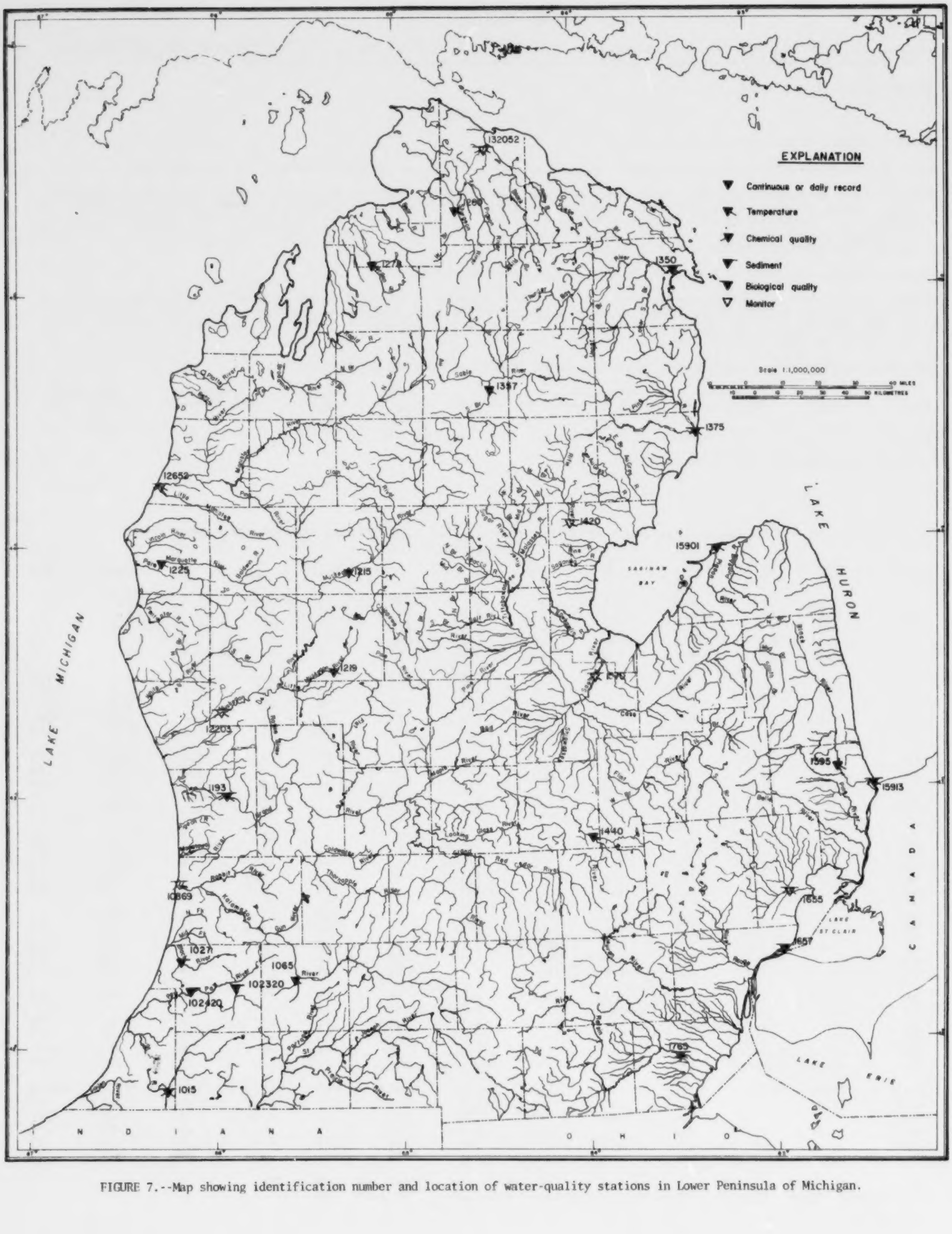
EXPLANATION
Continuous or daily record
Temperature
Chemical quality
Sediment
Biological quality
Monitor
Scale 1:1,000,000
10 0 10 20 30 40 MILES
10 0 10 20 30 40 50 KILOMETRES
132052
1260
1278
1350
1357
1375
12652
1420
15901
1225
1215
1219
1570
12203
1193
1595
15913
1440
10869
1655
1657
1027
1065
102320
102420
1765
1015
LAKE MICHIGAN
LAKE HURON
SAGINAW BAY
LAKE ST CLAIR
LAKE ERIE
CANADA
INDIANA
OHIO

FIGURE 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan.

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW¼ sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi (1.3 km) northeast of Windigo, and 35 mi (56 km) southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi^2 (34.2 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft (184 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records fair. ERTS satellite telemeter and recording rain gage at station. Capacity rain gage located near mouth. Hydrologic bench-mark stations are installed in specially selected areas where water resources have not yet been affected by works of man. Continuous records of natural hydrologic conditions, such as streamflow and water quality, will make possible assessment of changes which occur as a result of changes in climate and other natural factors. These data will provide a frame of reference against which hydrologic changes wrought by man may be evaluated.

AVERAGE DISCHARGE.--17 years, 17.5 ft^3/s (0.496 m^3/s), 18.00 in/yr (457 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft^3/s (13.6 m^3/s) May 1, 1972, gage height, 6.82 ft (2.079 m), from rating curve extended above 160 ft^3/s (4.53 m^3/s) based on runoff characteristics of nearby stations; maximum gage height, 6.88 ft (2.097 m) Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft^3/s (0.012 m^3/s) Aug. 25, 1977; minimum gage height, 2.55 ft (0.777 m) Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 110 ft^3/s (3.12 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 2	1000	*240	6.80	*5.65	1.722	Apr. 10	2300	196	5.55	5.37	1.637

Minimum discharge, 0.60 ft^3/s (0.017 m^3/s) Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.2	14	5.0	1.9	1.6	13	154	31	14	23	1.1	1.1
2	5.0	12	4.4	1.8	1.6	10	170	31	26	17	1.0	1.1
3	4.7	11	4.0	1.7	1.6	8.8	116	52	51	13	1.1	.92
4	4.3	11	4.2	1.6	1.6	7.0	103	54	62	11	1.1	.86
5	3.9	10	4.2	1.6	1.6	5.7	77	47	47	9.8	1.1	.80
6	3.8	9.2	4.6	1.6	1.6	5.0	62	39	34	8.3	3.1	.76
7	3.7	8.6	5.2	1.6	1.6	4.6	57	33	25	6.1	3.5	1.3
8	3.5	8.4	5.2	1.6	1.6	4.4	77	29	21	5.4	2.6	1.4
9	3.4	10	4.5	1.6	1.6	4.3	78	27	19	4.7	2.1	1.0
10	3.4	12	4.0	1.6	1.6	4.2	125	25	16	3.9	1.9	.92
11	3.6	9.0	3.3	1.6	1.6	4.1	138	24	14	3.6	1.8	.85
12	3.7	8.2	3.2	1.6	1.6	4.1	84	22	12	3.3	1.5	.82
13	3.5	8.6	3.3	1.6	1.6	4.1	73	20	15	3.2	1.3	.79
14	3.3	8.4	3.0	1.6	1.6	4.1	64	19	18	2.7	1.2	.74
15	3.2	7.7	2.9	1.6	1.6	4.1	58	18	17	2.3	1.5	.73
16	3.4	7.4	2.8	1.6	1.7	4.1	58	17	15	2.1	1.3	.80
17	5.1	6.4	2.7	1.6	1.8	4.1	67	15	13	2.1	1.1	.80
18	6.1	6.2	2.7	1.6	3.0	4.1	57	14	11	2.1	1.0	.80
19	5.7	5.8	2.6	1.6	7.0	3.9	48	13	9.9	1.9	.99	.77
20	5.3	6.0	2.6	1.6	12	3.7	40	12	9.7	1.7	.92	.77
21	5.4	6.6	2.5	1.6	17	3.4	35	11	11	1.6	.86	.77
22	5.1	7.3	2.5	1.6	24	3.3	35	11	9.9	1.4	.83	.77
23	7.9	8.6	2.4	1.6	35	3.8	64	10	8.7	1.2	.83	.73
24	41	8.2	2.4	1.6	50	4.4	66	11	18	1.3	.83	.73
25	72	7.2	2.3	1.6	40	5.9	54	18	25	1.3	.77	.73
26	47	6.2	2.2	1.6	30	8.6	47	18	19	1.2	.80	.88
27	33	6.0	2.2	1.6	20	9.4	42	16	15	1.0	.74	1.1
28	25	6.0	2.2	1.6	16	19	40	14	21	.98	.71	.95
29	20	5.9	2.1	1.6	---	34	37	13	40	.92	.68	.89
30	17	5.7	2.0	1.6	---	79	34	12	34	.88	.77	1.0
31	16	---	2.0	1.6	---	89	---	11	---	.93	.74	---
TOTAL	373.2	247.6	99.2	50.2	281.5	367.2	2160	687	651.2	139.91	39.77	26.58
MEAN	12.0	8.25	3.20	1.62	10.1	11.8	72.0	22.2	21.7	4.51	1.28	.89
MAX	72	14	5.2	1.9	50	89	170	54	62	23	3.5	1.4
MIN	3.2	5.7	2.0	1.6	1.6	3.3	34	10	8.7	.88	.68	.73
CFSM	.91	.63	.24	.12	.77	.89	5.46	1.68	1.64	.34	.10	.07
IN.	1.05	.70	.28	.14	.79	1.03	6.09	1.94	1.84	.39	.11	.07

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CAL YR 1980  TOTAL  3815.65   MEAN 10.4   MAX 125   MIN  .85   CFSM  .79   IN 10.75
WTR YR 1981  TOTAL  5123.36   MEAN 14.0   MAX 170   MIN  .68   CFSM 1.06   IN 14.44
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04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--In addition to the temperature recorder record, samples were collected approximately bimonthly. Temperature recorder malfunctioned Nov. 8, 9. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.0°C July 26, 30, 31, 1970, July 18, Aug. 1, 1975, July 20, 1977, July 8, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.0°C July 8; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 22...	1300	5.2	117	7.8	3.0	12.4	94	K11	K5	61	--	17
FEB 03...	1430	1.6	184	7.4	.0	13.6	95	<1	<1	78	--	21
APR 29...	1500	37	65	7.4	4.0	11.8	92	K4	K1	37	17	9.7
MAY 21...	1330	11	91	7.4	11.5	10.6	100	K6	K2	41	7.0	11
JUL 15...	1300	2.5	154	7.8	16.0	8.9	92	82	--	77	7.0	21
SEP 23...	1145	.76	205	7.9	6.0	11.6	95	82	40	96	3.0	26

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
OCT 22...	4.5	2.6	8	.2	.4	--	70	0	47	1.5	4.5	3.1
FEB 03...	6.3	4.2	10	.2	.4	.30	100	0	70	5.4	5.2	4.8
APR 29...	3.0	1.9	10	.1	.4	.30	--	--	24	--	5.5	1.2
MAY 21...	3.2	2.3	11	.2	.4	.30	--	--	34	--	6.1	1.7
JUL 15...	5.9	4.1	10	.2	.4	.30	--	--	70	--	4.5	4.6
SEP 23...	7.5	6.2	12	.3	.5	--	--	--	93	--	5.2	9.2

DATE	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC TOTAL (MG/L AS N)
OCT 22...	.1	11	97	79	.13	1.4	.11	.11	--	--	--	--
FEB 03...	<.1	16	113	101	.15	.49	.16	.16	.030	.030	.04	.20
APR 29...	<.1	9.9	74	43	.10	7.4	.04	.04	.040	.040	.05	.50
MAY 21...	<.1	7.4	71	53	.10	2.2	.03	.02	.040	.020	.03	.43
JUL 15...	<.1	12	126	95	.17	.85	.07	.07	.020	.020	.03	.54
SEP 23...	<.1	12	140	123	.19	.29	.04	.02	.020	<.010	.01	.23

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 22...	--	--	--	.020	.06	--	.00	--	--	--	--
FEB 03...	.23	.39	1.7	.020	.06	<.010	--	9.4	--	--	--
APR 29...	.54	.58	2.6	.020	.06	<.010	--	--	9	.90	100
MAY 21...	.47	.50	2.2	<.010	.03	.010	--	14	1	.03	100
JUL 15...	.56	.63	2.8	<.010	.03	<.010	--	19	3	.02	100
SEP 23...	.25	.29	1.3	<.010	--	<.010	--	5.7	--	--	--

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)
OCT 22...	1300	1	1	<50	10	1	0	<1	30	8	<3
APR 29...	1500	0	0	100	20	<1	--	3	10	0	<3

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)
OCT 22...	2	440	360	0	<10	<4	10	10	.2	<.1	<10
APR 29...	5	380	130	11	<10	<4	10	6	.3	.1	<10

DATE	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)
OCT 22...	0	0	0	0	33	<6.0	10	<4	--	--	.00
APR 29...	0	0	0	0	17	<6.0	30	30	16	.2	<.01

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DISSOLVED (PCI/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (PCI/L AS U-NAT)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DISSOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L)	URANIUM DISSOLVED, EXTRACTION (UG/L)
OCT											
22...	1300	<1.0	<.3	<1.4	<.4	2.9	<.4	2.7	<.4	.03	.02

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)
OCT												
22...	1300	.00	0	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)
OCT												
22...	.00	.0	.00	.00	.0	.00	.0	.00	.0	.00	.00	.0

DATE	HEPTACHLOR EPOXIDE TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG)
OCT											
22...	.00	.0	.00	.0	.00	.00	.0	.00	.00	.00	.0

DATE	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PERTHANE IN BOTTOM MATERIL (UG/KG)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
OCT											
22...	.00	.00	.00	.00	.00	.0	.00	.00	.00	.00	.00

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.0	6.5	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
2	9.0	7.5	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
3	7.5	6.5	3.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
4	6.5	5.0	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
5	5.0	4.0	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0
6	5.5	4.5	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0
7	6.0	5.0	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0
8	6.0	6.0	2.5	---	.0	.0	.0	.0	.0	.0	.0	.0
9	6.0	4.0	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
10	5.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	5.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	5.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	4.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	3.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	3.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
16	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	4.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	4.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	4.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	4.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.5	.0
26	4.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.5	.5
27	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.5	.5
28	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.5	.5
29	2.0	2.0	.0	.0	.0	.0	.0	.0	---	---	.5	.5
30	2.0	2.0	.0	.0	.0	.0	.0	.0	---	---	.5	.5
31	2.0	2.0	---	---	.0	.0	.0	.0	---	---	1.0	1.0
MONTH	9.0	2.0			.0	.0	.0	.0	.0	.0	1.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.0	1.0	5.0	4.0	11.0	10.0	17.0	13.5	19.5	18.0	17.5	15.5
2	1.0	1.0	6.0	5.0	11.5	9.5	17.5	14.0	20.5	17.5	15.0	13.5
3	1.0	1.0	6.0	4.5	11.0	10.0	17.5	15.5	20.0	17.5	15.0	12.5
4	1.0	1.0	5.5	5.0	13.0	9.5	19.0	16.5	21.0	17.5	16.0	13.5
5	1.0	1.0	7.0	5.5	15.0	12.5	19.0	16.0	20.5	16.5	14.0	12.0
6	1.0	.5	7.5	5.5	15.0	13.5	20.0	16.5	19.5	17.5	13.0	12.0
7	.5	.5	6.0	5.5	14.0	12.0	21.0	17.0	17.5	16.5	14.0	12.5
8	.5	.5	6.0	5.5	14.0	12.0	22.0	17.5	18.0	15.5	13.5	12.0
9	.5	.5	8.0	6.0	14.5	12.0	21.0	17.5	18.5	17.0	13.0	9.5
10	1.0	.5	6.0	4.5	14.5	12.0	19.0	15.0	18.0	16.5	14.0	11.0
11	1.0	1.0	7.5	4.5	15.0	11.5	19.0	16.5	18.0	15.0	14.0	11.5
12	1.5	1.0	8.5	5.5	16.0	12.5	18.5	16.5	18.5	15.5	14.0	11.0
13	1.5	1.5	8.5	6.0	15.0	13.5	19.5	16.0	19.5	16.5	13.0	11.5
14	1.5	1.0	10.0	6.5	13.5	12.5	18.5	16.0	19.0	16.0	12.5	10.5
15	1.5	1.0	10.5	7.0	13.0	12.5	18.0	14.5	19.5	15.5	11.0	9.5
16	2.5	1.5	10.5	8.0	13.0	11.5	20.0	16.5	16.5	13.0	10.0	9.0
17	2.5	2.5	10.0	6.5	14.0	11.0	19.0	17.0	16.5	12.5	10.5	9.0
18	2.5	2.0	10.5	6.5	14.5	13.0	18.5	16.5	16.5	13.0	11.5	9.5
19	3.0	2.0	11.5	7.0	14.5	11.5	19.5	16.0	17.5	13.5	10.5	9.0
20	3.5	2.5	13.0	8.5	13.5	12.5	19.0	16.5	17.0	13.5	9.5	7.5
21	3.0	2.5	13.5	9.5	13.0	12.0	17.0	14.0	18.0	14.0	8.0	6.5
22	3.0	3.0	13.5	10.0	13.5	12.0	17.5	13.0	17.5	15.0	7.0	5.0
23	3.0	2.5	13.0	11.5	13.0	11.0	17.5	13.5	19.5	16.5	7.0	5.0
24	2.5	2.0	13.0	11.5	13.0	11.5	16.5	16.0	19.0	17.0	9.5	7.0
25	3.5	2.5	12.0	10.0	13.5	11.0	16.5	15.0	17.0	14.0	8.5	8.0
26	4.0	3.5	12.0	9.5	15.0	11.5	17.0	13.5	16.5	15.5	9.5	8.0
27	4.0	4.0	13.0	9.0	15.0	12.5	17.5	13.5	17.0	14.0	9.5	7.5
28	4.5	4.0	12.0	10.0	15.0	13.5	19.0	14.0	16.5	12.5	7.5	6.0
29	5.0	4.0	12.5	11.0	15.5	13.0	18.5	14.5	16.0	15.0	7.0	6.5
30	5.5	4.5	12.0	10.0	16.0	14.0	17.5	15.5	17.5	15.5	6.5	6.0
31	---	---	12.0	9.0	---	---	19.5	17.0	18.0	16.0	---	---
MONTH	5.5	.5	13.5	4.0	16.0	9.5	22.0	13.0	21.0	12.5	17.5	5.0

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04031000 BLACK RIVER NEAR BESSEMER, MI

LOCATION.--Lat 46°30'41", long 90°04'28", in NE¼ SE¼ sec.32, T.48 N., R.46 W., Gogebic County, Hydrologic Unit 04020101, on right bank 450 ft (137 m) downstream from bridge on county highway, 500 ft (152 m) downstream from Powder Mill Creek, and 2.5 mi (4.0 km) northwest of Bessemer.

DRAINAGE AREA.--200 mi² (518 km²).

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,154.3 ft (351.83 m) National Geodetic Vertical Datum of 1929 (levels by registered surveyor).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Mar. 29 to Apr. 1, which are fair. Prior to 1967, flow included some ground water pumped from mines at Bessemer. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 235 ft³/s (6.655 m³/s), 15.96 in/yr (405 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft³/s (419 m³/s) Apr. 24, 1960, gage height, 14.27 ft (4.349 m), from floodmark, from rating curve extended above 5,300 ft³/s (150 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 6.8 ft³/s (0.19 m³/s) Sept. 25, Oct. 1-3, 1976; minimum gage height, 0.36 ft (0.110 m) Sept. 9, 1970.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,500 ft³/s (42.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 25	1100	2120	60.0	5.95	1.814	May 5	0800	1910	54.1	5.60	1.707
Mar. 30	unknown	*3210	90.9	*7.54	2.298	June 15	0700	2360	66.8	6.34	1.932
Apr. 10	2300	1700	48.1	5.24	1.597						

Minimum discharge, 20 ft³/s (0.57 m³/s) Sept. 5, 15, 28, gage height, 0.58 ft (0.177 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	178	423	112	59	58	220	2900	635	92	226	45	26
2	227	360	110	58	58	210	2580	519	84	194	42	24
3	295	324	105	58	58	200	2680	453	109	156	43	23
4	244	296	105	58	57	190	2120	1090	105	203	71	22
5	207	265	110	58	56	185	1420	1740	90	150	56	21
6	192	247	120	58	56	180	1180	1300	82	106	52	21
7	200	231	120	58	55	170	1270	930	69	87	59	32
8	192	222	125	58	55	165	1430	723	69	71	51	33
9	162	268	120	58	55	160	1380	573	62	62	48	30
10	136	271	110	58	55	155	1530	467	63	52	50	28
11	278	214	100	58	55	150	1520	383	66	47	48	27
12	437	209	85	58	55	145	1110	313	69	44	40	25
13	380	250	76	58	55	140	904	248	78	42	37	24
14	324	266	70	58	55	135	854	220	343	40	33	22
15	273	234	66	58	56	130	681	192	1650	43	32	22
16	233	207	64	58	70	125	568	169	952	43	29	27
17	256	196	61	58	90	120	492	145	562	60	29	31
18	265	175	60	58	110	120	413	125	371	53	27	28
19	275	170	60	58	125	115	386	112	248	43	27	26
20	256	162	60	58	140	115	352	100	393	118	25	26
21	255	165	60	59	160	115	310	89	499	185	25	25
22	233	165	60	60	200	120	292	76	760	114	25	23
23	230	191	60	62	250	130	779	85	588	82	25	22
24	1010	174	60	62	265	150	861	198	763	67	26	22
25	2070	165	60	62	260	200	736	192	652	77	25	22
26	1650	150	60	62	250	411	622	181	467	69	25	24
27	1210	145	60	62	240	536	555	160	341	55	25	25
28	920	134	60	62	230	1050	575	132	269	48	23	25
29	681	121	60	62	---	2300	508	118	353	42	27	27
30	546	115	60	60	---	3000	469	119	279	39	26	28
31	505	---	60	60	---	2500	---	101	---	43	27	---
TOTAL	14320	6515	2499	1834	3229	13642	31477	11888	10528	2661	1123	761
MEAN	462	217	80.6	59.2	115	440	1049	383	351	85.8	36.2	25.4
MAX	2070	423	125	62	265	3000	2900	1740	1650	226	71	33
MIN	136	115	60	58	55	115	292	76	62	39	23	21
CFSM	2.31	1.09	.40	.30	.58	2.20	5.25	1.92	1.76	.43	.18	.13
IN.	2.66	1.21	.46	.34	.60	2.54	5.85	2.21	1.96	.49	.21	.14

CAL YR 1980 TOTAL 88577 MEAN 242 MAX 2570 MIN 21 CFSM 1.21 IN 16.48
WTR YR 1981 TOTAL 100477 MEAN 275 MAX 3000 MIN 21 CFSM 1.38 IN 18.69

04031500 PRESQUE ISLE RIVER AT MARENISCO, MI

LOCATION.--Lat 46°22'20", long 89°41'32", in SE¼ NW¼ sec.21, T.46 N., R.43 W., Gogebic County, Hydrologic Unit 04020101, on left bank 0.3 mi (0.5 km) upstream from highway bridge in Marenisco, and 1.5 mi (2.4 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--171 mi^2 (443 km^2).

PERIOD OF RECORD.--February 1945 to current year.

REVISED RECORDS.--WSP 1707: 1954. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,489.30 ft (453.939 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 27, 1949, nonrecording gage at site 0.3 mi (0.5 km) downstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation for lake or pond level control at several locations in the headwaters. Since 1959, occasional regulation by Presque Isle Flooding Reservoir, usable capacity, about 3,000 acre-ft (3.7 hm^3), 2.5 mi (4.0 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 177 ft^3/s (5.013 m^3/s), 14.06 in/yr (357 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,520 ft^3/s (99.7 m^3/s) Apr. 25, 1960, gage height, 11.25 ft (3.429 m); minimum observed, 13 ft^3/s (0.37 m^3/s) Sept. 30, 1948, gage height, 2.25 ft (0.686 m), site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 965 ft^3/s (27.3 m^3/s) May 6, gage height, 7.15 ft (2.179 m); minimum, 25 ft^3/s (0.71 m^3/s) Sept. 24, 25; minimum gage height, 3.17 ft (0.966 m) Sept. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	174	228	119	100	105	140	828	327	154	444	61	38
2	166	212	120	100	100	125	799	324	144	361	84	36
3	185	199	115	100	98	120	767	306	136	294	81	38
4	168	192	110	100	96	110	768	454	128	281	81	31
5	158	179	110	100	95	105	716	772	122	254	74	30
6	148	172	110	100	94	105	668	945	113	224	70	34
7	146	164	111	100	94	100	629	832	110	197	131	37
8	131	165	120	100	94	96	639	673	108	176	124	42
9	124	176	120	100	94	94	646	541	101	159	99	41
10	126	175	120	100	94	90	628	448	76	146	84	35
11	131	151	120	100	94	86	614	390	61	135	76	33
12	146	160	120	100	94	82	588	348	70	126	67	33
13	145	168	120	100	94	80	540	314	79	117	62	33
14	141	176	115	100	94	78	515	284	240	113	62	30
15	134	167	110	100	96	74	477	267	463	116	61	29
16	135	160	110	100	100	72	411	246	519	114	59	32
17	152	158	110	100	110	70	366	232	470	114	56	37
18	149	153	110	100	120	68	336	195	349	107	52	37
19	144	144	105	100	130	66	321	179	259	104	55	32
20	139	143	105	105	140	64	311	171	279	107	56	30
21	136	142	105	105	150	62	296	165	321	124	57	28
22	130	141	105	105	160	62	277	159	363	124	57	29
23	128	146	100	110	175	62	371	159	401	118	54	28
24	230	141	100	110	190	62	467	215	429	113	48	26
25	476	140	100	110	190	74	469	240	396	110	46	26
26	549	135	100	110	180	128	424	249	356	110	51	33
27	501	124	100	110	170	176	380	236	304	104	51	36
28	413	121	100	110	155	256	363	210	273	94	48	27
29	332	118	100	110	---	457	340	202	347	88	46	33
30	284	116	100	105	---	667	314	183	449	75	43	41
31	254	---	100	105	---	777	---	167	---	60	40	---
TOTAL	6375	4766	3390	3195	3406	4608	15268	10433	7620	4809	2036	995
MEAN	206	159	109	103	122	149	509	337	254	155	65.7	33.2
MAX	549	228	120	110	190	777	828	945	519	444	131	42
MIN	124	116	100	100	94	62	277	159	61	60	40	26
CFSM	1.21	.93	.64	.60	.71	.87	2.98	1.97	1.49	.91	.38	.19
IN.	1.39	1.04	.74	.70	.74	1.00	3.32	2.27	1.66	1.05	.44	.22

CAL YR 1980 TOTAL 60491 MEAN 165 MAX 818 MIN 42 CFSM .97 IN 13.16
WTR YR 1981 TOTAL 66901 MEAN 183 MAX 945 MIN 26 CFSM 1.07 IN 14.55

04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'25", long 89°04'38", in SE¼ NE¼ sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, Ottawa National Forest, on right bank 25 ft (8 m) downstream from bridge on Forest Service Road 172, 2.4 mi (3.9 km) upstream from Bond Falls Reservoir, and 5.7 mi (9.2 km) southeast of Paulding.

DRAINAGE AREA.--164 mi² (425 km²).

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft (452.829 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 173 ft³/s (4.899 m³/s), 14.33 in/yr (364 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft³/s (58.1 m³/s) Apr. 30, 1951, gage height, 10.0 ft (3.05 m), from high-water mark; minimum, 27 ft³/s (0.76 m³/s) Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft (0.902 m) Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 740 ft³/s (21.0 m³/s) June 15, gage height, 6.87 ft (2.094 m); minimum daily, 96 ft³/s (2.72 m³/s) Feb. 6-14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	190	135	105	100	170	508	264	175	198	131	120
2	211	183	125	105	100	160	536	249	169	178	227	119
3	221	172	110	100	99	155	581	244	168	168	200	114
4	207	169	115	100	98	150	665	332	169	158	170	114
5	193	164	125	100	98	150	699	577	162	150	158	112
6	185	160	135	100	96	145	629	690	157	143	150	108
7	178	156	135	100	96	145	576	613	148	136	250	114
8	171	153	130	100	96	140	574	483	145	132	319	133
9	165	158	125	100	96	140	565	394	142	128	278	126
10	160	161	115	100	96	135	546	346	140	123	228	116
11	162	153	100	100	96	130	533	312	148	122	199	111
12	170	160	110	100	96	130	495	285	145	122	184	108
13	165	168	120	100	96	130	441	266	142	121	170	106
14	158	170	120	100	96	130	408	249	392	118	160	104
15	156	166	115	100	98	125	369	237	685	121	148	104
16	155	161	115	100	105	120	334	228	703	120	139	104
17	160	156	115	100	110	120	315	211	601	121	131	106
18	167	152	110	100	120	120	292	199	445	128	137	105
19	165	147	105	100	135	120	279	184	338	122	134	103
20	161	152	100	100	145	120	270	174	308	131	120	101
21	159	149	100	100	150	125	258	166	326	156	115	100
22	152	147	100	100	150	127	244	160	348	143	113	101
23	151	150	105	100	170	130	320	156	348	128	111	99
24	171	149	105	100	205	131	428	176	361	122	110	99
25	266	139	105	100	205	134	404	198	328	175	106	101
26	267	135	105	100	200	151	344	264	285	180	109	104
27	240	135	105	100	190	170	319	257	249	148	110	109
28	217	135	105	100	180	206	310	223	220	135	108	106
29	201	135	105	100	---	307	293	213	220	126	108	107
30	202	135	105	100	---	403	274	205	216	121	115	112
31	196	---	105	100	---	470	---	187	---	118	131	---
TOTAL	5752	4660	3505	3110	3522	5089	12809	8742	8383	4292	4869	3266
MEAN	186	155	113	100	126	164	427	282	279	138	157	109
MAX	267	190	135	105	205	470	699	690	703	198	319	133
MIN	151	135	100	100	96	120	244	156	140	118	106	99
CFSM	1.13	.95	.69	.61	.77	1.00	2.60	1.72	1.70	.84	.96	.67
IN.	1.30	1.06	.80	.71	.80	1.15	2.91	1.98	1.90	.97	1.10	.74

CAL YR 1980 TOTAL 57901 MEAN 158 MAX 488 MIN 92 CFSM .96 IN 13.13
WTR YR 1981 TOTAL 67999 MEAN 186 MAX 703 MIN 96 CFSM 1.13 IN 15.42

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW¼ NE¼ sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft (12 m) upstream from intake to pipeline No. 2, 0.8 mi (1.3 km) downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi (2.6 km) east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft (439.397 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft (0.914 m) higher.

REMARKS.--Records good except those below 10 ft³/s (0.28 m³/s), which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 140 ft³/s (3.965 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 368 ft³/s (10.4 m³/s) May 5, 1960; no flow at times each year since 1961; minimum gage height observed, -0.03 ft (-0.009 m) Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	50	190	290	238	31	11	14	217	55	292	282
2	16	50	206	291	236	31	11	14	217	47	291	280
3	64	50	206	291	235	70	11	14	217	47	291	279
4	115	50	235	291	235	175	12	15	217	176	292	140
5	115	50	263	290	235	239	11	15	217	294	292	1.3
6	116	71	262	291	235	238	12	95	217	292	292	.34
7	203	127	262	291	235	237	12	240	217	228	213	.10
8	296	127	261	289	235	236	12	305	161	107	91	2.6
9	305	127	260	289	235	235	12	305	178	296	16	4.6
10	303	127	259	289	235	234	13	305	251	305	115	1.7
11	302	127	283	289	235	233	13	303	275	305	210	.02
12	300	173	307	287	235	232	13	303	275	305	210	.10
13	300	184	305	282	235	230	13	301	275	303	262	.56
14	299	89	304	249	235	229	11	301	277	301	308	105
15	298	47	302	202	235	228	8.1	300	147	300	307	197
16	297	85	298	206	235	114	8.0	300	20	296	306	197
17	296	85	297	206	135	123	7.8	298	19	293	305	197
18	194	85	297	204	38	231	8.0	298	97	292	304	196
19	109	112	292	202	34	229	8.1	298	162	291	303	195
20	150	175	292	202	31	228	5.7	254	323	290	301	194
21	198	175	290	202	30	227	1.1	188	323	289	299	194
22	207	175	290	201	31	226	1.6	291	323	288	296	193
23	207	175	290	201	31	225	4.6	292	268	294	293	244
24	207	174	290	200	30	224	4.0	292	196	301	292	296
25	99	174	290	200	30	222	2.8	292	278	301	291	298
26	14	174	290	200	30	120	1.8	291	278	299	290	256
27	13	174	290	200	31	33	32	228	278	298	288	220
28	13	174	290	212	31	33	101	119	278	296	286	212
29	77	173	290	241	---	34	52	119	204	295	285	204
30	164	173	290	241	---	23	14	176	98	294	284	204
31	102	---	290	239	---	11	---	217	---	294	283	---
TOTAL	5395	3732	8571	7560	4246	5181	427.6	6783	6503	8072	8188	4594.32
MEAN	174	124	276	244	152	167	14.3	219	217	260	264	153
MAX	305	184	307	291	238	239	101	305	323	305	308	298
MIN	13	47	190	200	30	11	1.1	14	19	47	16	.02

CAL YR 1980 TOTAL 52251.00 MEAN 143 MAX 311 MIN 1.7
WTR YR 1981 TOTAL 69260.92 MEAN 190 MAX 323 MIN .02

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW¼ sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi (4.0 km) east of Paulding.

DRAINAGE AREA.--190 mi² (492 km²).

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft (407.088 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 41,300 acre-ft (50.9 hm³), corrected, between gage heights of 120 ft (36.6 m) (maximum drawdown) and 141 ft (43.0 m) (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft (53.0 hm³) July 3, 1953, gage height, 141.7 ft (43.19 m), of which 1,680 acre-ft (2.07 hm³) was uncontrolled storage; minimum, no usable storage at times; minimum gage height observed, 116.0 ft (35.36 m) Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 39,380 acre-ft (48.6 hm³) May 8, 9, 10, gage height, 140.2 ft (42.73 m); minimum, 4,830 acre-ft (5.96 hm³) Mar. 26, gage height, 123.1 ft (37.52 m).

MONTHEND GAGE HEIGHT AND CONTENTS AT 0930, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	137.3	32690	--	--
Oct. 31	136.8	31560	-1130	-18.4
Nov. 30	136.8	31560	0	0
Dec. 31	131.4	20300	-11260	-183
CAL YR 1980	--	--	-6460	-8.9
Jan. 31	126.5	10950	-9350	-152
Feb. 28	125.7	9460	-1490	-26.8
Mar. 31	124.8	7840	-1620	-26.3
Apr. 30	137.7	33610	+25770	+433
May 31	138.6	35680	+2070	+33.7
June 30	139.3	37290	+1610	+27.1
July 31	135.0	27600	-9690	-158
Aug. 31	131.0	19500	-8100	-132
Sept. 30	129.1	15890	-3610	-60.7
WTR YR 1981	--	--	-16800	-23.2

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW¼ sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi (0.2 km) upstream from State Highway 28, 3.8 mi (6.1 km) west of village of Trout Creek, and 7.5 mi (12.1 km) downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi² (526 km²).

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft (345.043 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by Bond Falls Reservoir (station 03034000) 7.5 mi (12.1 km) upstream. Diversion to South Branch Ontonagon River 8.5 mi (13.7 km) upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 67.5 ft³/s (1.912 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Nov. 7, 1951, gage height, 5.05 ft (1.539 m); minimum, 14 ft³/s (0.40 m³/s) sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft (0.347 m), from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 178 ft³/s (5.04 m³/s) May 8, 9, 10, gage height, 2.27 ft (0.692 m); minimum, 30 ft³/s (0.85 m³/s) Mar. 16, gage height, 1.47 ft (0.448 m), result of freezeup; minimum daily, 44 ft³/s (1.25 m³/s) Dec. 10, 11, Jan. 9, 13, 15, 27, 28, Feb. 15, Mar. 9-11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	52	53	48	46	46	47	90	56	53	57	63	59
2	56	52	46	46	46	46	79	53	61	57	61	58
3	55	54	44	46	46	46	80	53	62	57	60	55
4	54	51	45	46	46	46	74	96	61	57	60	48
5	52	51	47	46	46	46	63	117	61	56	58	48
6	51	51	49	46	45	45	64	70	60	56	64	48
7	51	51	49	45	45	46	76	59	59	55	74	51
8	50	52	50	45	45	45	80	99	60	55	64	49
9	50	53	48	44	45	44	67	177	59	56	60	48
10	51	53	44	45	45	44	68	175	62	56	66	48
11	54	51	44	45	45	44	63	130	63	56	65	48
12	55	54	48	45	45	45	57	51	64	57	60	48
13	53	57	47	44	45	45	57	50	63	56	58	48
14	52	55	47	45	45	46	59	50	93	57	58	48
15	51	54	46	44	44	45	54	50	83	57	58	48
16	51	53	47	45	46	46	53	50	69	57	59	50
17	52	53	47	45	46	45	51	49	63	58	58	50
18	51	52	47	46	49	45	51	48	61	58	57	48
19	51	51	47	45	49	46	51	50	59	58	56	48
20	52	52	47	45	47	45	50	49	66	70	56	48
21	53	52	47	45	46	45	50	48	63	63	55	48
22	51	52	47	45	53	45	51	48	70	59	55	48
23	53	53	48	45	57	46	75	50	65	58	55	48
24	65	51	47	45	52	47	74	50	89	58	55	48
25	77	49	47	46	50	49	61	54	69	69	55	48
26	62	51	47	46	48	54	58	56	62	61	57	49
27	57	51	47	44	49	57	57	52	60	58	57	48
28	55	51	48	44	48	71	58	51	60	58	57	50
29	53	51	47	45	---	99	55	52	62	58	64	48
30	53	49	47	45	---	98	54	51	59	57	67	52
31	53	---	46	46	---	81	---	50	---	58	59	---
TOTAL	1676	1563	1455	1400	1319	1599	1880	2094	1941	1803	1851	1483
MEAN	54.1	52.1	46.9	45.2	47.1	51.6	62.7	67.5	64.7	58.2	59.7	49.4
MAX	77	57	50	46	57	99	90	177	93	70	74	59
MIN	50	49	44	44	44	44	50	48	53	55	55	48

CAL YR 1980 TOTAL 18849 MEAN 51.5 MAX 133 MIN 43
WTR YR 1981 TOTAL 20064 MEAN 55.0 MAX 177 MIN 44

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE¼ sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft (3 m) upstream from bridge on U.S. Highway 45, 700 ft (213 m) downstream from East Branch, and 2.8 mi (4.5 km) southeast of Rockland.

DRAINAGE AREA.--671 mi^2 (1,738 km^2).

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft (201.50 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1959, nonrecording gage at site 400 ft (122 m) upstream at same datum. Apr. 1, 1959 to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records fair. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi (48.3 km) upstream. Diversion to South Branch Ontonagon River by Bond Falls Canal (station 04033500) 31.0 mi (49.9 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 529 ft^3/s (14.98 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft^3/s (765 m^3/s) Aug. 22, 1942, gage height, 21.2 ft (6.46 m), from floodmarks, from rating curve extended above 7,500 ft^3/s (212 m^3/s) on basis of slope-area measurement of peak flow; minimum observed, 142 ft^3/s (4.02 m^3/s) Dec. 3, 1963, discharge measurement; minimum daily, 145 ft^3/s (4.11 m^3/s) Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,380 ft^3/s (181 m^3/s) May 5, gage height, 9.04 ft (2.755 m); minimum, 187 ft^3/s (5.30 m^3/s) Dec. 3, 4; minimum daily, 194 ft^3/s (5.49 m^3/s) Dec. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	438	527	274	240	255	600	4390	732	320	332	253	271
2	404	464	249	240	250	580	3620	683	311	296	336	269
3	483	429	194	240	250	550	3330	554	461	281	443	255
4	465	410	270	240	250	520	2640	3210	383	275	1130	240
5	380	378	387	245	250	480	1700	5250	337	275	583	232
6	356	350	388	245	245	450	1440	2310	315	271	369	230
7	334	349	358	245	245	420	2470	1290	323	259	588	245
8	319	365	386	245	245	390	2720	953	878	251	861	289
9	303	528	399	245	245	370	2080	842	462	250	567	277
10	290	670	342	250	240	350	2640	749	380	249	413	254
11	441	670	335	245	240	330	2170	664	391	241	398	247
12	788	670	325	245	240	315	1370	488	388	240	346	252
13	653	691	320	245	245	300	1130	420	375	240	311	251
14	491	801	310	245	245	280	1110	382	1540	240	301	243
15	406	625	300	245	255	270	856	358	3940	245	289	232
16	356	463	290	250	270	260	701	337	1610	245	274	239
17	345	415	290	250	320	250	641	326	923	246	263	241
18	389	356	285	255	400	245	540	312	584	281	251	252
19	408	320	280	255	600	240	475	306	382	271	250	244
20	474	364	275	260	800	238	435	304	333	400	245	230
21	473	382	270	265	1100	235	383	298	378	735	245	228
22	432	395	270	270	1300	260	363	297	435	502	237	228
23	583	471	265	275	1500	339	2020	287	591	355	235	235
24	1470	521	260	280	1500	399	3050	371	1310	303	235	235
25	3770	337	255	285	1350	610	1630	602	1320	308	235	246
26	1880	314	250	285	1200	1290	1100	478	645	357	239	262
27	1220	303	250	285	1000	1570	934	426	442	331	235	284
28	1010	343	250	280	800	2720	969	361	361	303	232	277
29	758	339	250	270	---	5680	865	413	380	287	230	270
30	603	310	245	265	---	4470	667	500	385	268	290	272
31	579	---	245	260	---	3480	---	354	---	255	270	---
TOTAL	21301	13560	9067	7950	15840	28491	48439	24857	20883	9392	11154	7530
MEAN	687	452	292	256	566	919	1615	802	696	303	360	251
MAX	3770	801	399	285	1500	5680	4390	5250	3940	735	1130	289
MIN	290	303	194	240	240	235	363	287	311	240	230	228

CAL YR 1980 TOTAL 195832 MEAN 535 MAX 6450 MIN 188
WTR YR 1981 TOTAL 218464 MEAN 599 MAX 5680 MIN 194

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW¼ NE¼ sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi (0.6 km) downstream from dam at outlet of Gogebic Lake and 1.5 mi (2.4 km) east of Bergland.

DRAINAGE AREA.--162 mi^2 (420 km^2).

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft (393.439 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi (0.6 km) upstream at different datum.

REMARKS.--Records good except those below 25 ft^3/s (0.71 m^3/s), which are fair. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft (43.4 hm^3). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 175 ft^3/s (4.956 m^3/s), 14.67 in/yr (373 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft^3/s (39.6 m^3/s) Apr. 26, 1960, gage height, 5.98 ft (1.823 m); minimum daily, 0.70 ft^3/s (0.020 m^3/s) Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 904 ft^3/s (26.5 m^3/s) May 6, gage height, 4.81 ft (1.466 m); minimum daily, 2.2 ft^3/s (0.06 m^3/s) Sept. 22-27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	450	280	173	200	177	168	346	369	170	308	8.2	5.8
2	411	286	166	207	178	166	386	386	192	296	8.2	5.4
3	404	272	164	202	177	167	435	406	183	307	13	5.4
4	339	320	207	196	173	167	488	518	181	301	44	4.5
5	271	352	213	202	171	166	519	778	182	282	79	4.0
6	246	336	187	211	169	165	531	896	166	264	81	4.0
7	318	269	180	207	166	163	546	887	157	259	151	3.4
8	326	218	181	201	165	163	565	874	123	245	222	3.4
9	309	204	175	196	163	160	587	829	142	205	222	3.2
10	287	197	175	194	158	159	608	797	162	163	208	3.2
11	145	197	206	187	157	158	628	423	162	104	210	3.2
12	9.4	200	247	183	154	157	637	130	153	52	204	3.2
13	7.0	196	225	176	150	154	633	130	153	32	194	3.2
14	6.4	158	187	172	149	154	634	129	148	14	190	3.2
15	5.8	196	197	169	148	151	422	128	210	14	166	3.2
16	115	259	212	169	145	150	184	120	319	14	60	3.0
17	226	235	208	164	142	147	114	85	353	14	10	2.8
18	119	236	228	161	143	148	48	41	353	11	10	2.5
19	7.0	331	238	154	143	149	32	53	287	11	10	2.5
20	161	362	243	150	143	148	20	145	295	10	9.7	2.5
21	280	270	251	147	143	144	19	157	283	12	9.4	2.4
22	268	279	251	143	149	143	18	154	287	8.2	9.1	2.2
23	191	238	253	137	157	141	18	148	293	8.2	8.8	2.2
24	106	229	253	133	163	140	18	153	324	8.2	8.5	2.2
25	24	226	253	130	161	140	25	155	360	9.4	7.0	2.2
26	50	212	252	127	161	146	29	152	384	9.4	7.0	2.2
27	202	201	250	125	163	152	77	208	380	8.8	5.8	2.2
28	251	193	241	124	167	164	186	183	359	8.2	5.8	2.4
29	212	191	221	159	---	194	285	146	354	8.2	5.8	2.4
30	242	180	181	181	---	245	361	137	324	7.6	5.8	2.4
31	277	---	182	178	---	289	---	138	---	8.2	5.8	---
TOTAL	6265.6	7323	6600	5285	4435	5058	9399	9855	7439	3002.4	2178.9	94.4
MEAN	202	244	213	170	158	163	313	318	248	96.9	70.3	3.15
MAX	450	362	253	211	178	289	637	896	384	308	222	5.8
MIN	5.8	158	164	124	142	140	18	41	123	7.6	5.8	2.2

CAL YR 1980 TOTAL 70281.2 MEAN 192 MAX 538 MIN 4.0 CFSM 1.19 IN. 16.14
WTR YR 1981 TOTAL 66935.3 MEAN 183 MAX 896 MIN 2.2 CFSM 1.13 IN. 15.37

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE¼ sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft (24 m) downstream from Cisco Lake Dam, 2.5 mi (4.0 km) upstream from Langford Creek, 5.0 mi (8.0 km) upstream from U.S. Highway 2, and 13 mi (21 km) west of Watersmeet.

DRAINAGE AREA.--50.7 mi^2 (131.3 km^2).

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft (509.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft (1.219 m) higher.

REMARKS.--Records good except those below 1.0 ft^3/s (0.028 m^3/s), which are fair. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft (19.2 hm^3). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 46.9 ft^3/s (1.328 m^3/s), 12.56 in/yr (319 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft^3/s (8.16 m^3/s) May 1-4, 1951, gage height, 6.10 ft (1.859 m), present datum; minimum daily, 0.09 ft^3/s (0.003 m^3/s) June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 219 ft^3/s (6.20 m^3/s) June 17, gage height, 5.71 ft (1.740 m); minimum daily, 0.25 ft^3/s (0.007 m^3/s) Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	96	29	29	29	89	91	1.3	134	54	.74	23
2	17	96	29	29	29	64	76	1.2	87	53	1.3	23
3	17	92	30	29	29	47	78	1.3	52	52	46	17
4	17	89	30	30	29	46	98	26	53	50	73	11
5	17	88	30	30	29	46	104	99	52	48	72	5.1
6	17	87	30	30	29	46	97	150	50	24	73	.55
7	17	85	30	30	29	45	100	154	51	3.6	121	.40
8	17	86	31	30	29	45	108	152	26	2.9	150	.40
9	65	81	31	30	29	44	106	151	5.8	2.6	145	.40
10	98	80	40	30	29	44	98	148	5.8	2.6	81	.40
11	94	79	47	30	30	44	98	120	5.8	1.4	28	.34
12	93	79	47	30	30	27	106	92	5.8	.70	28	.34
13	91	78	46	30	29	17	101	58	6.9	.55	28	.31
14	89	78	46	30	29	17	101	29	21	.45	28	.25
15	86	76	45	31	29	17	54	29	117	.40	26	.31
16	85	74	45	38	30	17	2.9	29	213	.38	25	.31
17	85	72	45	46	30	18	1.9	28	213	.37	12	.28
18	81	72	45	46	31	18	1.4	27	206	.39	1.8	.31
19	80	70	45	46	32	19	1.4	26	203	.37	.91	.31
20	78	69	45	46	32	19	1.3	25	204	.48	.88	.31
21	74	68	44	45	42	19	1.2	14	203	.43	.78	.31
22	74	68	44	45	52	19	1.0	6.2	204	.39	.84	.28
23	76	65	44	44	78	35	1.6	6.5	203	.51	.86	.31
24	74	65	44	44	96	47	1.8	8.4	202	16	17	.31
25	98	64	44	44	93	47	1.6	8.8	199	27	27	.31
26	109	63	43	35	92	63	1.6	20	198	26	26	.37
27	107	62	43	28	90	77	1.4	31	193	26	25	.34
28	104	46	43	28	90	78	1.4	63	186	25	25	.37
29	102	29	34	28	---	79	1.3	106	181	25	25	25
30	101	29	28	28	---	89	1.3	103	108	25	24	75
31	97	---	29	28	---	98	---	102	---	11	25	---
TOTAL	2176	2186	1206	1067	1225	1380	1439.1	1815.7	3589.1	480.52	1138.11	186.92
MEAN	70.2	72.9	38.9	34.4	43.8	44.5	48.0	58.6	120	15.5	36.7	6.23
MAX	109	96	47	46	96	98	108	154	213	54	150	75
MIN	16	29	28	28	29	17	1.0	1.2	5.8	.37	.74	.25

CAL YR 1980 TOTAL 14214.85 MEAN 38.8 MAX 166 MIN .15 CFSM .77 IN 10.43
WTR YR 1981 TOTAL 17889.45 MEAN 49.0 MAX 213 MIN .25 CFSM .97 IN 13.13

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°43'15", long 89°12'25", in NE¼ sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 50 ft (15 m) downstream from bridge on Victoria Road, 1.8 mi (2.9 km) southwest of Rockland, and 2.4 mi (3.9 km) downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi^2 (3,470 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft (194.682 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft (15 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Considerable regulation by powerplant on West Branch 5 mi (8 km) upstream; Bond Falls Reservoir (station 04034000) 34 mi (55 km) upstream; Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft (62.6 hm^3), in headwaters.

AVERAGE DISCHARGE.--39 years, 1,411 ft^3/s (39.96 m^3/s), 14.30 in/yr (363 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft^3/s (1,190 m^3/s) Aug. 22, 1942, gage height, 28.6 ft (8.73 m) from floodmark, from rating curve extended above 14,000 ft^3/s (396 m^3/s) on basis of slope-area measurement of peak flow; minimum daily, 192 ft^3/s (5.44 m^3/s) July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 9,000 ft^3/s (255 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Mar. 30	0400	*11100	314	*13.56	4.133	May 5	1700	9870	280	12.93	3.941

Minimum daily discharge, 262 ft^3/s (7.42 m^3/s) Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1360	1580	924	920	860	1600	9390	1790	1160	1430	661	810
2	1340	1480	881	920	940	1600	8380	1670	1060	1230	740	563
3	1400	1310	640	900	760	1500	8600	1590	1290	1200	1010	718
4	1370	1300	890	750	820	1200	6500	4910	1210	1070	1740	538
5	1320	1280	1090	800	820	1200	5000	8980	1160	910	1460	645
6	1290	1260	1240	880	820	1200	4000	6580	1130	957	1160	435
7	1260	1250	1280	920	780	1150	6000	5040	773	1150	1170	480
8	1240	1140	1260	900	840	1150	6800	3460	1980	1110	1950	980
9	1220	1290	1210	860	820	1100	6400	3040	1360	740	1750	823
10	1210	1390	1050	920	800	1050	7200	2500	871	716	1300	408
11	1340	1270	972	860	800	1050	5500	2510	1030	880	1280	353
12	1620	1080	1000	860	740	1050	3800	1670	1280	698	1000	354
13	1560	1410	1000	860	760	960	4000	1410	1110	775	1140	271
14	1440	1700	970	920	750	1000	3500	1450	2330	734	883	262
15	1330	1620	900	870	800	970	2500	1350	6810	506	1030	284
16	1260	1380	920	840	1050	920	1700	1320	4360	602	919	417
17	1270	1340	940	800	1100	900	1600	1180	2650	673	712	276
18	1300	1290	970	820	1600	700	1300	954	1890	636	506	330
19	1310	1100	970	820	1550	900	1000	846	1550	689	543	263
20	1360	1190	940	820	1700	840	1050	946	1580	817	898	297
21	1160	1320	900	820	2000	840	1000	899	1880	1430	785	697
22	1280	1310	920	830	2500	900	950	1020	2100	1230	465	521
23	1450	1390	1050	840	2900	980	3500	831	2320	617	508	410
24	2580	1420	950	740	2900	1100	5400	944	3350	845	769	302
25	6980	1240	1000	820	2600	1500	3000	1340	3780	935	472	548
26	4490	1060	950	880	2400	2500	2800	1340	2760	823	647	698
27	3000	970	920	800	2100	3340	1900	1290	2090	772	610	530
28	2390	1130	980	840	1800	5350	1950	1290	1790	999	670	608
29	1870	1130	1050	780	---	9980	2070	1270	1960	740	699	560
30	1450	1100	1000	800	---	10500	1980	1170	1640	750	441	614
31	1450	---	950	820	---	8900	---	993	---	723	696	---
TOTAL	54900	38730	30717	26210	38310	67930	118770	65583	60254	27387	28614	14995
MEAN	1771	1291	991	845	1368	2191	3959	2116	2008	883	923	500
MAX	6980	1700	1280	920	2900	10500	9390	8980	6810	1430	1950	980
MIN	1160	970	640	740	740	700	950	831	773	506	441	262

CAL YR 1980 TOTAL 527094 MEAN 1440 MAX 9000 MIN 365 CFSM 1.07 IN 14.63
WTR YR 1981 TOTAL 572400 MEAN 1568 MAX 10500 MIN 262 CFSM 1.17 IN 15.89

04040000 ONTONAGON RIVER NEAR ROCKLAND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

REMARKS.--Daily record is from once-daily observer samples. In addition, monthly samples are collected as a cross-section sample at upstream side of bridge on Victoria Road. Complete ice cover during winter period. October 1975 to September 1977 water-quality monitor at present site.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1975-80), 192 micromhos Mar. 26, 1977, May 28, 1978; minimum (water years 1975-76, 1979-80), 45 micromhos Dec. 2, 1975.
WATER TEMPERATURES: Maximum (water years 1975-80), 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 20...	1645	1400	121	8.0	7.0	11.3	96	42	K38	58	10	16
NOV 19...	1315	940	104	7.8	1.0	14.0	101	K17	16	47	10	13
DEC 18...	1030	950	126	7.9	.0	13.8	97	11	K5	58	9	16
JAN 13...	1430	860	132	7.7	.0	13.7	96	K5	K1	61	10	17
FEB 17...	1445	1110	150	7.8	.0	13.2	93	K5	K2	65	0	18
MAR 17...	1430	1220	134	7.8	.0	13.6	96	K9	K14	57	0	17
APR 28...	1300	1990	92	7.7	7.5	11.4	97	K32	58	45	2	13
MAY 19...	1430	1080	109	7.9	15.0	10.4	104	<4	K2	46	0	13
JUN 16...	1500	3840	86	7.3	18.0	8.7	94	--	K3800	44	3	13
JUL 16...	1330	943	118	7.9	22.0	8.1	94	29	70	61	2	17
AUG 18...	0915	294	162	7.9	15.0	9.1	92	33	300	78	0	22
SEP 21...	1415	894	155	7.6	14.5	9.5	95	20	K10	77	3	21

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT 20...	4.3	2.3	8	.1	3.1	--	72	0	59	.9	4.2
NOV 19...	3.6	2.1	9	.1	.9	--	60	0	49	1.1	5.4
DEC 18...	4.4	2.2	8	.1	.8	--	76	0	62	1.2	4.2
JAN 13...	4.6	2.3	7	.1	.8	.60	76	0	62	2.0	4.4
FEB 17...	4.9	2.9	9	.2	.9	.70	83	0	68	2.1	3.7
MAR 17...	3.5	2.9	10	.2	1.1	.80	76	0	62	1.7	4.2
APR 28...	3.1	2.2	9	.1	1.0	.70	53	0	43	1.4	4.4
MAY 19...	3.3	2.1	9	.1	.9	.70	64	0	52	1.1	3.6
JUN 16...	2.8	1.7	8	.1	1.1	.80	50	0	41	4.1	5.1
JUL 16...	4.4	3.4	11	.2	.8	.60	72	0	59	1.6	3.0
AUG 18...	5.6	2.8	7	.1	.9	.70	96	0	79	2.0	4.1
SEP 21...	5.9	2.5	7	.1	.5	--	90	0	74	3.5	1.9

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT 20...	2.6	.1	9.3	95	71	359	.03	.03	.060	.020	.03
NOV 19...	2.5	.1	8.0	85	58	216	.08	.08	.050	.030	.04
DEC 18...	2.1	.1	9.2	89	69	228	.12	.11	.050	.050	.06
JAN 13...	2.2	<.1	10	87	73	202	.14	.14	.030	.030	.04
FEB 17...	2.6	<.1	11	112	84	336	.20	.20	.070	.070	.09
MAR 17...	3.3	<.1	11	88	76	290	.15	.15	.030	.030	.04
APR 28...	2.0	<.1	7.6	94	55	505	.09	.09	.110	.070	.09
MAY 19...	1.8	<.1	6.4	70	58	204	.02	.02	.050	.010	.01
JUN 16...	2.0	<.1	7.2	81	59	840	.10	.08	.090	.040	.05
JUL 16...	2.8	<.1	8.1	93	78	237	.06	.06	.020	.020	.03
AUG 18...	2.3	<.1	10	109	96	86.5	.02	.01	--	.080	.10
SEP 21...	2.1	<.1	8.0	89	85	215	.02	.02	.020	.010	.01

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 20...	.37	.43	.46	2.0	.060	.18	.030	--	26	98	100
NOV 19...	.35	.40	.48	2.1	.040	.12	.020	9.7	16	41	100
DEC 18...	.37	.42	.54	2.4	.030	.03	.030	8.5	--	--	--
JAN 13...	.28	.31	.45	1.9	.020	.03	.020	--	--	--	--
FEB 17...	.30	.37	.57	2.5	.090	.28	.010	5.5	--	--	--
MAR 17...	.19	.22	.37	1.6	.060	.18	.020	10	--	--	--
APR 28...	.47	.58	.67	3.0	.100	.31	.010	--	130	698	100
MAY 19...	.43	.48	.50	2.2	.030	.09	.040	8.8	18	52	100
JUN 16...	.63	.72	.82	3.6	.170	.52	.050	16	194	2010	100
JUL 16...	.28	.30	.36	1.6	.020	.06	.020	--	22	56	100
AUG 18...	--	.35	.37	1.6	.040	.12	.010	7.7	24	19	100
SEP 21...	.24	.26	.28	1.2	.020	.06	<.010	5.4	12	29	100

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)	COBALT, DIS- SOLVED (UG/L AS CO)
OCT 20...	1645	3	3	100	40	--	2	20	20	0	0
JAN 13...	1430	--	2	100	30	--	2	30	20	1	0
APR 28...	1300	1	0	100	30	--	3	10	<10	2	0
JUL 16...	1330	2	2	100	60	1	1	120	10	5	1

DATE	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)	MERCURY DIS- SOLVED (UG/L AS HG)
OCT 20...	4	2	1000	250	3	0	40	20	<.1	<.1
JAN 13...	3	0	360	170	--	6	10	7	.3	<.1
APR 28...	12	7	2800	290	28	2	50	10	.5	.1
JUL 16...	5	2	430	140	4	1	60	6	<.1	<.1

DATE	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C)
OCT 20...	3	2	0	0	0	0	20	7	18	.7
JAN 13...	3	0	0	0	0	0	20	<4	8.6	.2
APR 28...	10	2	0	0	0	0	50	20	9.8	1.5
JUL 16...	17	2	0	0	0	0	20	10	6.4	.5

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 19,80	MAR 17,81	MAY 19,81	JUN 16,81
TIME	1315	1430	1430	1500
TOTAL CELLS/ML	120	510	130	1000
DIVERSITY: DIVISION	1.0	1.0	1.0	1.3
.CLASS	1.4	1.0	1.0	1.3
..ORDER	1.8	1.5	1.0	1.9
...FAMILY	2.7	2.5	2.0	3.0
....GENUS	2.7	2.6	2.0	3.2

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	27#	22	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	14	11	--	-	13	10	56	5
....CLOSTERIOPSIS	--	-	--	-	--	-	14	1
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	64#	50	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	14	11	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	--	-	14	1
....MELOSIRA	--	-	--	-	--	-	14	1
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	27#	22	14	3	--	-	14	1
....COCCONEIS	--	-	--	-	13	10	14	1
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	14	1
....CYMBELLA	--	-	--	-	--	-	84	8
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	14	3	--	-	--	-
....SYNEDRA	--	-	82#	16	26#	20	28	3
...GOMPHONEMATACEAE								
....GOMPHONEMA	14	11	55	11	--	-	42	4
...NAVICULACEAE								
....FRUSTULIA	--	-	--	-	--	-	14	1
....NAVICULA	14	11	--	-	13	10	56	5
...NITZSCHIACEAE								
....NITZSCHIA	--	-	68	14	--	-	130	12
...SURIRELLACEAE								
....SURIRELLA	--	-	14	3	--	-	42	4
.CHRYSOPHYCEAE								
..CHROMULINALES								
...CHRYSOCOCCACEAE								
....CHRYSOCOCCUS	14	11	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..NOSTOCALES								
...HAMMATOIDEACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	280#	27
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	140#	27	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	120#	24	--	-	240#	23
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 16,81	AUG 18,81	SEP 21,81
TIME	1330	0915	1415
TOTAL CELLS/ML	190	100	330
DIVERSITY: DIVISION	1.3	0.0	1.3
.CLASS	1.3	0.0	1.3
..ORDER	1.8	0.0	1.8
...FAMILY	2.6	1.8	1.8
....GENUS	2.6	1.8	1.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....SCHROEDERIA	--	-	--	-	--	-
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	13	7	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	--	-	14	4
....CLOSTERIOPSIS	--	-	--	-	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	77#	40	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	13	7	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	13	7	--	-	--	-
....MELOSIRA	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
....COCCONEIS	26	13	14	14	--	-
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....SYNEDRA	--	-	43#	43	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	13	7	--	-	14	4
...NAVICULACEAE						
....FRUSTULIA	--	-	--	-	--	-
....NAVICULA	--	-	29#	29	--	-
...NITZSCHIACEAE						
....NITZSCHIA	26	13	14	14	--	-
...SURIRELLACEAE						
....SURIRELLA	--	-	--	-	--	-
.CHRYSOPHYCEAE						
..CHROMULINALES						
...CHRYSOCOCCACEAE						
....CHRYSOCOCCUS	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..NOSTOCALES						
...HAMMATOIDEACEAE						
....RAPHIDIOPSIS	--	-	--	-	--	-
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	43	13
....APHANIZOMENON	--	-	--	-	--	-
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	170#	52
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	13	7	--	-	86#	26

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	105	---	120	---	---	---	90	101	123	102	163	142
2	102	---	117	133	134	98	93	---	123	104	---	147
3	106	102	126	---	134	100	---	---	137	---	136	148
4	104	102	135	---	143	101	---	---	130	---	150	148
5	---	102	126	---	133	106	80	120	126	---	129	---
6	106	102	---	---	133	116	85	82	---	108	129	---
7	106	102	---	132	---	---	83	78	---	104	138	159
8	---	---	126	132	---	---	84	81	129	110	---	146
9	112	---	125	---	171	125	---	---	116	118	---	150
10	---	105	122	132	140	123	105	---	137	109	111	152
11	---	106	122	---	146	126	77	87	123	---	112	172
12	---	109	119	137	146	140	82	94	124	---	110	172
13	118	118	---	131	154	131	85	97	---	119	109	172
14	---	124	---	131	---	---	84	99	---	118	---	171
15	112	---	123	133	---	---	83	102	153	127	---	165
16	116	---	123	131	143	132	93	---	96	122	---	163
17	120	106	107	---	150	137	96	---	98	---	129	164
18	---	110	125	---	154	141	94	107	107	---	126	164
19	---	104	---	132	161	137	---	110	94	---	129	---
20	122	106	---	---	143	136	96	113	---	136	125	---
21	97	---	---	134	---	---	109	116	---	136	126	161
22	120	---	136	132	---	---	109	116	102	122	---	---
23	128	---	124	135	118	146	164	---	102	124	---	163
24	95	104	125	---	106	145	107	---	99	124	130	---
25	126	108	---	---	97	145	---	150	94	126	142	160
26	96	109	124	134	93	146	---	125	86	---	143	158
27	85	87	124	134	95	124	90	125	---	126	146	159
28	90	94	---	135	---	---	102	117	---	126	142	160
29	92	---	124	134	---	---	92	120	100	132	---	158
30	101	---	128	133	---	92	91	---	100	133	---	158
31	98	---	128	---	---	88	---	---	---	134	142	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.5	---	.5	---	---	---	2.5	10.0	17.5	22.0	22.0	21.0
2	12.0	---	.0	.0	.0	.5	3.5	---	19.0	23.0	---	21.0
3	11.0	4.5	.5	---	.0	.0	---	---	17.5	---	23.5	21.0
4	9.5	4.5	.5	---	.0	.0	---	---	20.0	---	23.0	19.0
5	---	3.5	.5	---	.0	.0	2.5	11.0	21.0	---	24.0	---
6	12.0	5.0	---	---	.0	.0	4.0	11.5	---	27.0	23.5	---
7	12.5	4.5	---	.0	---	---	4.0	13.0	---	27.0	21.0	18.0
8	---	---	.5	.0	---	---	5.0	13.5	19.0	27.5	---	19.0
9	11.5	---	.5	---	.0	.5	---	---	20.0	27.0	---	19.5
10	---	4.0	.0	.0	.0	.5	7.0	---	20.0	27.0	21.0	20.5
11	---	3.0	.0	---	.0	.5	7.0	11.0	20.5	---	22.5	19.0
12	---	2.5	.5	.0	.0	1.0	8.5	12.5	21.0	---	22.0	19.0
13	8.5	2.5	---	.0	.0	.5	8.0	14.0	---	26.0	22.5	18.0
14	---	2.5	---	.0	---	---	7.5	14.0	---	24.0	---	18.0
15	8.5	---	.5	.0	---	---	8.5	15.0	19.5	23.0	---	17.0
16	8.0	---	.5	.0	.0	.5	9.5	---	18.5	23.0	---	16.5
17	9.0	2.0	.5	---	.5	.5	10.0	---	22.0	---	22.0	16.5
18	---	2.0	.0	---	.5	.0	10.0	15.0	19.5	---	21.0	16.0
19	---	2.0	---	.0	.5	.0	---	16.0	20.0	---	22.0	---
20	8.0	2.0	---	---	.5	.5	9.5	17.0	---	22.0	22.0	---
21	7.0	---	---	.0	---	---	8.5	18.0	---	21.0	22.0	19.0
22	7.0	---	.0	.0	---	---	9.5	18.5	19.5	21.5	---	---
23	6.5	---	.0	---	.5	1.0	6.0	---	19.0	21.0	---	15.0
24	6.5	2.0	.0	---	.5	2.0	7.0	---	20.5	22.0	23.0	---
25	6.0	1.5	---	---	.5	2.5	---	17.0	19.0	20.5	22.5	14.0
26	4.0	1.5	.0	.0	.5	1.5	---	15.5	19.0	---	22.0	14.0
27	4.0	1.5	.0	.0	.5	2.5	9.0	18.0	---	21.0	22.5	12.0
28	4.0	1.5	---	.0	---	---	8.5	17.5	---	22.0	21.0	13.0
29	3.5	---	.0	.0	---	---	11.0	19.0	19.0	23.0	---	12.5
30	4.0	---	.0	.0	---	1.5	9.0	---	20.0	22.0	---	12.0
31	3.5	---	.0	---	---	2.5	---	---	---	24.0	22.5	---

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE¼ SE¼ sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft (9 m) downstream from highway bridge, 3.0 mi (4.8 km) downstream from Rock River, 3.5 mi (5.6 km) northwest of Covington, 6.5 mi (10.5 km) upstream from Perch River, 8.5 mi (13.7 km) northeast of Sidnaw, and at mile 71 (114 km).

DRAINAGE AREA.--171 mi^2 (443 km^2).

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft (370.149 m) National Geodetic Vertical Datum of 1929. October 1912 to September 1915, nonrecording gage at site 200 ft (61 m) upstream at different datum. Apr. 2, 1943 to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 214 ft^3/s (6.060 m^3/s), 16.99 in/yr (432 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft^3/s (131 m^3/s) Apr. 24, 1960, gage height, 11.63 ft (3.545 m); minimum, 2.7 ft^3/s (0.076 m^3/s) Sept. 13, 1976, gage height, 3.17 ft (0.966 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,680 ft^3/s (47.6 m^3/s) Apr. 4, gage height, 7.64 ft (2.329 m); minimum, 22 ft^3/s (0.62 m^3/s) Sept. 6, 7, gage height, 3.72 ft (1.134 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	350	246	112	68	69	294	1410	432	93	149	36	34
2	306	228	110	68	68	279	1400	388	93	130	41	34
3	297	215	105	68	67	282	1590	354	108	114	76	33
4	270	208	102	68	66	273	1630	600	133	105	190	29
5	240	205	105	68	65	255	1380	1200	135	94	157	26
6	215	195	108	68	64	230	1210	1210	117	90	130	22
7	195	188	112	68	64	215	1180	720	107	80	413	27
8	180	182	121	68	64	200	1150	780	231	70	488	46
9	163	205	122	68	64	185	1060	620	258	67	460	50
10	151	205	110	68	64	175	1160	492	202	62	360	47
11	163	182	105	68	64	165	1400	413	157	56	264	45
12	222	188	100	68	64	155	1400	357	135	50	195	49
13	252	190	96	68	64	145	1190	312	122	45	159	43
14	246	200	94	67	65	140	1120	273	225	40	135	37
15	220	192	92	67	68	135	1030	243	869	38	114	32
16	205	165	88	67	70	130	854	212	962	35	99	28
17	198	173	86	68	82	125	720	192	860	41	86	30
18	195	155	84	68	98	120	635	175	640	80	73	37
19	190	153	82	69	130	115	565	159	444	60	64	41
20	188	141	80	70	170	110	488	147	340	70	56	38
21	190	145	78	70	230	105	420	135	312	117	54	33
22	192	137	76	71	318	110	374	126	322	103	46	28
23	200	149	76	72	385	115	650	115	346	89	43	26
24	243	147	74	73	420	125	878	110	354	72	39	26
25	444	135	72	74	413	140	830	108	322	67	34	26
26	468	131	70	74	374	160	710	121	270	64	32	28
27	420	117	70	75	343	220	590	122	220	59	29	35
28	368	115	70	74	315	342	530	119	185	53	27	37
29	306	115	70	74	---	806	476	114	180	44	27	38
30	273	115	70	72	---	1120	424	108	167	38	33	39
31	264	---	70	70	---	1200	---	97	---	35	33	---
TOTAL	7814	5122	2810	2159	4328	8171	28454	10554	8909	2217	3993	1044
MEAN	252	171	90.6	69.6	155	264	948	340	297	71.5	129	34.8
MAX	468	246	122	75	420	1200	1630	1210	962	149	488	50
MIN	151	115	70	67	64	105	374	97	93	35	27	22
CFSM	1.47	1.00	.53	.41	.91	1.54	5.54	1.99	1.74	.42	.75	.20
IN.	1.70	1.11	.61	.47	.94	1.78	6.19	2.30	1.94	.48	.87	.23

CAL YR 1980 TOTAL 78272 MEAN 214 MAX 1370 MIN 42 CFSM 1.25 IN 17.03
WTR YR 1981 TOTAL 85575 MEAN 234 MAX 1630 MIN 22 CFSM 1.37 IN 18.62

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE¼ sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi (6.4 km) upstream from Clear Creek, 5.0 mi (8.0 km) southeast of Alston, and at mile 45 (72 km).

DRAINAGE AREA.--346 mi² (896 km²).

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft (216.50 m) mean tide at New York City datum (levels by Corps of Engineers). Prior to Jan. 5, 1948, nonrecording gage and Jan. 5, 1948 to Sept. 30, 1963, water-stage recorder at same site at datum 40.00 ft (12.192 m) lower.

REMARKS.--Records good. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, (water years 1933-40, 1943-81), 420 ft³/s (11.89 m³/s), 16.48 in/yr (419 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft³/s (208 m³/s) Apr. 24, 1960, gage height, 13.09 ft (3.990 m) present datum; minimum daily, 1 ft³/s (0.03 m³/s) Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,000 ft³/s (85.0 m³/s) Mar. 30, gage height, 7.96 ft (2.426 m); minimum daily, 21 ft³/s (0.595 m³/s) Aug. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	689	525	296	271	28	623	2170	703	245	643	206	99
2	656	471	297	273	243	621	2120	817	287	637	203	120
3	687	368	269	245	240	621	2210	711	442	627	204	119
4	689	439	271	245	242	424	2460	1070	508	618	216	118
5	466	468	269	245	245	424	2100	2190	543	451	316	22
6	466	467	268	244	247	421	1690	1900	543	268	298	22
7	460	460	27	245	248	423	1440	1650	646	268	325	22
8	461	404	270	244	28	421	1500	1150	647	269	638	236
9	464	404	274	246	221	423	1270	1170	648	264	637	236
10	467	405	275	244	244	624	1490	943	645	234	638	236
11	472	401	276	27	246	604	1810	794	641	237	640	234
12	413	409	272	247	247	613	1940	625	635	209	637	22
13	415	404	274	243	248	605	1570	630	591	211	636	22
14	419	405	273	245	248	512	1640	624	460	189	633	236
15	414	401	270	244	27	310	1300	629	631	161	405	120
16	420	404	265	245	244	302	1160	628	647	172	290	211
17	346	405	257	244	447	220	958	632	1080	212	290	212
18	412	403	237	29	456	308	878	457	1050	204	202	212
19	406	349	259	247	420	303	748	341	656	202	202	23
20	399	346	261	244	407	226	629	332	656	203	190	23
21	410	348	260	245	404	310	634	332	657	205	213	186
22	414	349	255	245	423	307	635	332	655	294	143	186
23	444	346	247	242	620	306	1060	336	653	290	21	186
24	421	350	254	243	624	304	1680	334	654	302	144	182
25	539	335	258	22	628	311	1280	335	654	306	139	185
26	1070	349	261	244	630	314	1260	339	651	210	137	24
27	876	297	260	244	627	397	1060	336	654	210	137	200
28	694	295	25	246	625	604	934	337	649	210	138	418
29	692	296	261	241	---	1300	845	284	648	199	22	178
30	687	295	264	241	---	2200	847	341	645	207	22	180
31	384	---	263	243	---	2170	---	337	---	209	120	---
TOTAL	16252	11598	7768	6973	9557	17551	41310	21639	18721	8921	9042	4470
MEAN	524	387	251	225	341	566	1377	698	624	288	292	149
MAX	1070	525	297	273	630	2200	2460	2190	1080	643	640	418
MIN	346	295	25	22	27	220	629	284	245	161	21	22
CFSM	1.51	1.12	.73	.65	.99	1.64	3.98	2.02	1.80	.83	.84	.43
IN.	1.75	1.25	.84	.75	1.03	1.89	4.44	2.33	2.01	.96	.97	.48

CAL YR 1980 TOTAL 153724 MEAN 420 MAX 1970 MIN 14 CFSM 1.21 IN 16.53
WTR YR 1981 TOTAL 173810 MEAN 476 MAX 2460 MIN 21 CFSM 1.30 IN 18.69

04043004 STURGEON RIVER NEAR CHASSELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°58'28", long 88°31'21", in NE¼ SW¼ sec.20, T.53 N., R.33 W., Houghton County, Hydrologic Unit 04020104, 2.2 mi (3.5 km) upstream from bridge on county road, 3.5 mi (5.6 km) south of Chassell, and at mile 5.2 (8.4 km).

DRAINAGE AREA.--723 mi^2 (1,873 km^2).

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1978 to September 1981.
WATER TEMPERATURES: March 1978 to September 1981.

REMARKS.--Daily record is from once-daily observer samples. In addition, depth-integrated, cross-section samples were collected approximately bimonthly. Samples were collected at bridge 2.2 mi (3.5 km) downstream or in the winter, through the ice in the vicinity of the gage site. Diurnal fluctuation and occasional slight regulation by powerplant at Prickett Dam at mile 45 (72 km). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 267 micromhos Feb. 19, 1980; minimum daily, 46 micromhos Apr. 26, 27, 29, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C July 26, 1978, July 13, 1979; minimum daily, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 194 micromhos Sept. 22; minimum daily, 55 micromhos Apr. 7.
WATER TEMPERATURES: Maximum daily, 24.5°C July 20; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 21...	1245	950	123	7.7	7.0	10.8	91	K10	K10	61	9	17
JAN 14...	1100	473	151	7.5	.0	11.7	82	K2	K1	66	6	18
MAR 18...	1115	599	126	7.3	.0	12.8	90	28	K4	47	0	14
MAY 20...	1130	933	99	7.5	14.0	9.3	91	K6	K9	50	1	14
JUL 17...	1115	287	134	7.5	21.0	7.5	85	84	45	68	4	19
SEP 22...	1015	330	176	7.6	12.5	9.4	89	20	K10	87	0	24

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT 21...	4.5	2.0	7	.1	.9	--	74	0	61	2.0	3.3
JAN 14...	5.0	2.3	7	.1	.7	.50	88	0	72	3.7	4.3
MAR 18...	2.8	2.4	10	.2	1.0	.70	68	0	56	4.8	4.9
MAY 20...	3.7	1.9	7	.1	.9	.70	60	0	49	3.1	5.3
JUL 17...	5.0	2.2	6	.1	.9	.70	78	0	64	4.1	2.6
SEP 22...	6.5	2.6	6	.1	.7	--	110	0	90	4.4	2.1

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT 21...	1.8	.1	9.4	97	71	249	.04	.04	.050	.020	.03
JAN 14...	1.8	<.1	12	93	81	119	.15	.14	.020	.010	.01
MAR 18...	2.4	<.1	12	82	70	133	.17	.17	.050	.050	.06
MAY 20...	1.7	<.1	7.0	74	65	186	.05	.04	.040	.040	.05
JUL 17...	1.4	<.1	8.4	98	80	75.9	.05	.05	.010	.010	.01
SEP 22...	1.6	<.1	8.6	98	97	87.3	.03	.03	.040	.030	.04

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 21...	.37	.42	.46	2.0	.030	.09	.010	--	10	26	100
JAN 14...	.28	.30	.45	2.0	<.010	.03	<.010	--	5	6.4	100
MAR 18...	.30	.35	.52	2.3	.040	.12	.010	8.5	68	110	100
MAY 20...	.47	.51	.56	2.5	.030	.09	<.010	--	19	48	100
JUL 17...	.27	.28	.33	1.5	--	.03	.020	--	10	7.7	100
SEP 22...	.22	.26	.29	1.3	.020	.06	<.010	4.8	5	4.5	100

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 21...	1245	3	3	100	40	--	3	20	0	0	0
JAN 14...	1100	--	3	<50	40	--	2	20	10	1	0
MAY 20...	1130	0	0	100	30	1	<1	10	10	4	0
JUL 17...	1115	--	2	100	30	1	<1	20	10	4	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 21...	2	1	740	410	2	0	40	20	<.1	<.1
JAN 14...	2	0	470	280	--	3	--	30	.3	<.1
MAY 20...	--	3	700	380	1	0	40	20	.2	<.1
JUL 17...	4	2	600	300	4	1	50	30	.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 21...	1	1	0	0	0	0	10	2	21	.4
JAN 14...	5	1	0	0	0	0	10	<4	9.2	.3
MAY 20...	6	2	0	0	0	0	30	<4	17	.4
JUL 17...	21	1	0	0	0	0	10	10	6.9	.3

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATF	JAN 14,81		MAR 18,81		MAY 20,81		JUL 17,81		SEP 22,81	
TIMF	1100		1115		1130		1115		1015	
TOTAL CFLLS/ML	26		170		140		3000		690	
DIVERSITY: DIVISION	0.0		1.2		0.7		0.9		1.9	
.CLASS	0.0		1.2		0.7		0.9		1.9	
..ORDER	0.0		1.2		0.9		1.4		2.1	
...FAMILY	0.0		2.6		0.9		1.4		2.3	
....GENUS	0.0		2.6		0.9		1.8		2.3	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	--	-	26	1	--	-
...SCFNEDESMACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	110#	17
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	14	8	--	-	--	-	--	-
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	410	14	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	26#	100	--	-	13	9	*	0	72	10
....MELOSIRA	--	-	--	-	--	-	130	4	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	42#	25	--	-	--	-	--	-
...FUNOTIACEAE										
....EUNOTIA	--	-	14	8	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	13	9	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	14	8	--	-	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	28#	17	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	14	8	--	-	*	0	86	13
...NITZSCHIACEAE										
....NIT7SCHIA	--	-	--	-	--	-	*	0	29	4
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	42#	25	120#	82	--	-	--	-
..NOSTOCALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	300	10	--	-
....APHANIZOMENON	--	-	--	-	--	-	1800#	61	290#	42
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORTA	--	-	--	-	--	-	270	9	--	-
FUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	100	15

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	102	115	134	144	122	58	66	105	128	141	156
2	---	110	122	136	147	121	56	72	108	128	140	153
3	---	98	123	139	147	121	56	72	106	129	144	165
4	---	104	118	141	146	122	56	72	106	155	156	165
5	---	105	125	141	146	119	56	74	105	153	125	161
6	---	96	127	142	147	119	56	72	106	157	157	161
7	---	108	120	142	146	123	55	76	106	155	125	164
8	---	112	131	141	149	124	63	76	96	155	157	165
9	---	113	120	147	149	116	63	74	95	155	111	161
10	---	98	126	146	150	116	58	98	96	157	156	164
11	---	96	126	161	150	117	59	98	94	157	145	156
12	---	96	120	161	151	116	57	97	98	156	144	156
13	---	96	123	161	151	126	58	98	98	155	156	156
14	---	98	121	147	151	125	63	98	96	138	156	156
15	---	97	128	139	151	123	62	97	86	137	156	156
16	---	97	129	140	157	125	61	98	88	138	159	156
17	---	97	130	146	150	128	68	98	82	139	156	156
18	---	98	131	146	150	128	69	97	82	140	156	---
19	---	99	131	142	141	124	69	98	82	143	152	156
20	---	103	132	142	143	122	67	99	83	155	156	156
21	103	105	131	142	121	123	68	100	82	151	156	156
22	98	107	131	144	116	123	59	96	84	153	156	194
23	101	114	134	148	120	122	62	95	92	151	156	174
24	104	103	134	149	115	124	---	96	92	153	160	172
25	109	120	134	146	122	117	62	97	93	155	156	169
26	98	115	134	144	123	119	62	97	125	---	156	173
27	111	112	134	144	124	80	66	97	97	---	144	173
28	99	122	135	144	124	74	67	104	97	128	144	173
29	100	123	139	144	---	66	66	103	122	111	144	172
30	106	120	138	146	---	65	67	102	99	111	144	162
31	102	---	138	143	---	57	---	100	---	125	163	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	6.5	1.5	.0	.0	.0	2.5	9.5	---	23.0	22.0	17.5
2	---	6.5	.5	.0	.0	.0	2.0	9.0	17.0	23.0	22.0	17.5
3	---	6.0	.5	.0	.0	.0	2.5	10.0	17.5	24.0	21.5	17.0
4	---	6.0	.5	.0	.0	.0	2.5	10.0	18.0	24.0	21.5	17.0
5	---	6.0	.5	.0	.0	.0	3.0	10.5	18.5	24.0	22.0	17.0
6	---	6.0	1.0	.0	.0	.0	3.0	10.0	18.0	23.5	21.5	16.5
7	---	5.0	.5	.0	.0	.0	3.5	10.0	18.5	23.5	21.0	17.0
8	---	4.0	1.0	.0	.0	.0	4.0	10.0	18.0	23.5	21.0	16.5
9	---	4.0	.5	.0	.0	.0	4.0	10.5	18.5	24.0	21.0	16.5
10	---	4.5	.0	.0	.0	.0	3.5	11.0	19.0	24.0	20.5	16.0
11	---	3.5	.0	.0	.0	.0	4.0	11.0	19.0	24.0	20.5	16.0
12	---	3.5	.0	.0	.0	.0	4.5	12.0	19.0	23.5	20.0	16.0
13	---	3.0	.0	.0	.0	.0	5.0	13.0	19.5	24.0	20.0	15.5
14	---	4.0	.0	.0	.0	.0	4.5	13.5	19.5	23.5	20.0	16.0
15	---	3.5	.0	.0	.0	.0	5.0	14.5	19.0	23.5	20.0	15.5
16	---	3.5	.0	.0	.0	.0	5.0	14.5	19.0	23.0	20.0	15.5
17	---	3.0	.0	.0	.0	.0	5.0	15.0	19.5	23.0	20.0	15.5
18	---	2.5	.0	.0	.0	.0	5.5	15.0	20.0	23.0	19.5	---
19	---	2.0	.0	.0	.0	.5	6.0	16.0	19.0	24.0	19.5	15.0
20	---	2.5	.0	.0	.0	.5	6.0	15.5	19.0	24.5	19.0	15.5
21	7.5	2.5	.0	.0	.0	1.0	6.0	15.5	19.5	24.0	19.0	15.0
22	7.0	3.0	.0	.0	.0	1.0	6.5	16.0	19.5	24.0	19.0	18.0
23	8.0	3.0	.0	.0	.0	1.5	6.5	16.5	20.0	24.0	19.0	18.0
24	8.0	2.5	.0	.0	.0	1.0	---	16.0	20.5	24.0	19.0	20.0
25	7.0	2.0	.0	.0	.0	1.0	7.0	16.0	21.0	24.0	18.5	18.0
26	7.0	2.0	.0	.0	.0	1.5	7.0	17.0	21.5	---	18.5	18.0
27	6.5	2.0	.0	.0	.0	1.5	8.0	16.0	22.0	---	18.5	18.0
28	6.5	1.5	.0	.0	.0	2.0	8.0	16.0	22.0	23.0	18.0	18.0
29	6.5	1.0	.0	.0	---	2.0	8.5	17.0	22.0	22.5	18.0	18.0
30	6.5	2.0	.0	.0	---	2.0	9.0	17.0	22.5	22.5	17.5	18.0
31	6.5	---	.0	.0	---	2.0	---	17.0	---	22.0	17.0	---

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE¼ SE¼ sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft (6 m) upstream from bridge on county highway, 2.0 mi (3.2 km) northeast of Lake Linden, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--28.0 mi² (72.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft (189.49 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. From April 1973 to December 1977, flow includes about 0.1 ft³/s (0.003 m³/s) mine pumpage. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--15 years, 44.7 ft³.s (1.266 m³/s), 21.68 in/yr (551 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,590 ft³/s (45.0 m³/s) May 10, 1979, gage height, 10.72 ft (3.267 m); minimum daily, 6.8 ft³/s (0.19 m³/s) Oct. 3, 1976; minimum gage height, 3.85 ft (1.173 m³/s) June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft³/s (10.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 30	0500	520	14.7	7.10	2.164	Apr. 23	2200	502	14.2	7.01	2.137
Apr. 11	0400	*656	18.6	*7.78	2.371						

Minimum daily discharge, 11 ft³/s (0.31 m³/s) Sept. 22-24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	31	23	17	17	55	380	53	43	36	15	16
2	22	28	21	17	17	50	314	46	52	28	16	18
3	23	27	21	17	17	45	336	53	208	25	15	16
4	21	28	21	17	17	40	330	97	115	28	34	15
5	20	27	21	17	17	35	202	135	64	24	23	14
6	18	26	21	17	17	32	156	85	42	21	32	14
7	18	25	27	17	17	30	198	61	33	19	66	15
8	18	24	36	17	17	29	268	50	36	18	43	25
9	18	49	30	17	17	29	260	45	33	17	28	28
10	17	44	26	17	17	29	442	42	32	16	24	26
11	32	32	25	17	17	28	446	41	29	16	34	24
12	64	29	24	17	17	29	232	43	28	16	23	21
13	46	32	24	17	17	29	208	38	29	15	19	19
14	34	34	22	17	18	29	222	34	50	15	18	16
15	28	32	22	17	19	29	140	31	181	15	17	15
16	25	28	21	17	22	29	121	28	89	14	16	18
17	31	28	21	17	26	28	147	27	51	16	15	20
18	39	25	20	17	32	27	120	26	36	15	14	17
19	37	25	20	17	46	25	83	25	28	15	14	15
20	31	26	20	17	56	24	65	24	25	15	13	13
21	28	30	19	17	54	24	55	23	26	15	13	12
22	27	30	18	17	61	25	57	22	24	14	13	11
23	44	32	18	17	104	30	266	21	22	14	13	11
24	104	34	18	17	134	35	305	23	55	14	13	11
25	194	30	18	18	109	46	140	23	81	62	13	12
26	110	26	18	19	85	69	100	21	45	41	12	14
27	72	25	17	19	75	86	85	21	31	25	13	20
28	62	24	17	18	64	150	96	20	31	20	12	18
29	49	24	17	18	---	334	77	21	103	17	12	18
30	39	24	17	18	---	474	62	84	58	16	13	19
31	35	---	17	17	---	318	---	46	---	15	13	---
TOTAL	1327	879	660	535	1126	2242	5913	1309	1680	637	619	511
MEAN	42.8	29.3	21.3	17.3	40.2	72.3	197	42.2	56.0	20.5	20.0	17.0
MAX	194	49	36	19	134	474	446	135	208	62	66	28
MIN	17	24	17	17	17	24	55	20	22	14	12	11
CFSM	1.53	1.05	.76	.62	1.44	2.58	7.04	1.51	2.00	.73	.71	.61
IN.	1.76	1.17	.88	.71	1.50	2.98	7.86	1.74	2.23	.85	.82	.68

CAL YR 1980 TOTAL 15220 MEAN 41.6 MAX 551 MIN 11 CFSM 1.49 IN 20.22
WTR YR 1981 TOTAL 17438 MEAN 47.8 MAX 474 MIN 11 CFSM 1.71 IN 23.17

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1971.

REMARKS.--Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 30, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.0°C July 7; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	11.0	3.5	3.0	1.5	.5	.0	.0	.0	.0	1.5	.5
2	12.5	10.0	3.5	3.0	.5	.0	.0	.0	.0	.0	.5	.0
3	10.0	8.5	4.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0
4	8.5	7.0	5.0	4.5	.0	.0	.0	.0	.0	.0	1.0	.0
5	7.5	5.0	4.5	3.0	1.0	.0	.0	.0	.0	.0	.0	.0
6	10.0	7.0	5.5	3.5	2.0	1.0	.0	.0	.0	.0	.5	.0
7	10.0	7.0	5.5	3.5	2.0	2.0	.0	.0	.0	.0	1.5	.0
8	11.0	9.0	3.5	1.5	2.0	.5	.0	.0	.0	.0	3.0	1.0
9	9.0	6.5	2.0	2.0	.5	.0	.0	.0	.0	.0	3.0	1.5
10	10.0	8.0	2.0	1.5	.0	.0	.0	.0	.0	.0	3.0	2.0
11	8.5	6.5	1.5	1.0	.0	.0	.0	.0	.0	.0	3.5	1.0
12	6.5	5.5	1.5	.5	.0	.0	.0	.0	.0	.0	4.0	1.5
13	6.0	5.5	2.0	1.0	.0	.0	.0	.0	.0	.0	2.5	.5
14	6.0	5.0	2.5	2.0	.0	.0	.0	.0	.0	.0	2.5	.0
15	6.5	4.5	2.5	2.0	.0	.0	.0	.0	.0	.0	2.0	.0
16	6.5	4.5	2.0	.5	.0	.0	.0	.0	.0	.0	1.0	.0
17	8.5	6.5	1.5	1.5	.0	.0	.0	.0	.0	.0	.5	.0
18	7.5	6.0	1.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
19	6.0	5.5	2.0	1.5	.0	.0	.0	.0	.0	.0	.5	.0
20	6.0	5.5	2.0	1.0	.0	.0	.0	.0	.0	.0	2.0	.5
21	6.0	4.5	2.0	1.5	.0	.0	.0	.0	1.5	.0	4.0	1.5
22	5.0	4.5	2.0	1.0	.0	.0	.0	.0	1.5	.5	5.0	1.5
23	5.0	4.5	2.0	1.5	.0	.0	.0	.0	.5	.5	4.5	2.0
24	5.5	5.0	1.5	.5	.0	.0	.0	.0	.5	.5	4.5	1.5
25	5.5	4.0	.5	.0	.0	.0	.5	.0	.5	.5	4.0	1.5
26	4.0	3.0	1.5	.5	.0	.0	.5	.0	1.0	.5	2.5	2.0
27	3.5	3.0	1.5	.5	.0	.0	.0	.0	1.0	.5	3.0	.5
28	3.0	2.0	1.0	.5	.0	.0	.0	.0	1.5	.5	2.5	1.0
29	3.0	2.5	1.5	1.0	.0	.0	.0	.0	---	---	1.0	.5
30	4.0	2.5	2.0	1.5	.0	.0	.0	.0	---	---	.5	.5
31	4.0	3.5	---	---	.0	.0	.0	.0	---	---	1.5	.5
MONTH	13.0	2.0	5.5	.0	2.0	.0	.5	.0	1.5	.0	5.0	.0

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	.5	9.5	6.0	14.0	12.5	18.0	14.0	18.5	15.5	17.0	14.5
2	3.0	.5	8.5	6.5	15.5	11.5	18.5	13.5	19.5	14.5	14.5	13.0
3	1.5	1.0	7.5	7.0	15.0	13.5	17.0	14.5	18.5	15.5	15.5	11.0
4	1.5	.5	8.5	7.5	17.0	12.5	20.0	15.0	19.0	15.0	15.0	13.5
5	2.0	.5	10.0	7.5	18.5	14.5	20.5	15.0	19.0	15.0	13.5	11.0
6	3.0	.5	10.0	6.5	17.5	14.5	21.5	15.5	18.0	15.0	14.0	12.0
7	4.0	1.5	11.0	7.0	15.5	13.0	22.0	16.0	16.0	15.0	13.5	12.0
8	3.5	1.5	10.5	8.0	16.0	13.0	21.5	16.5	18.0	14.0	14.0	11.5
9	5.0	1.5	10.5	6.5	17.5	13.0	20.5	16.5	18.5	16.0	14.5	10.0
10	5.5	2.5	9.5	5.0	18.0	14.5	20.5	15.5	17.5	15.5	16.0	12.0
11	4.0	2.0	10.0	6.5	18.0	14.0	19.0	16.0	18.5	15.0	14.5	12.5
12	5.5	2.5	11.5	7.5	19.0	15.0	18.0	15.0	19.0	15.5	15.5	12.5
13	5.0	4.0	11.0	8.5	16.5	14.5	20.5	15.5	18.5	15.5	16.0	13.0
14	4.5	3.0	13.0	8.5	16.0	14.0	18.5	14.5	19.5	16.0	15.5	12.5
15	5.0	2.0	14.5	9.5	16.5	15.5	16.5	12.0	19.0	15.5	14.0	11.5
16	8.0	4.0	13.5	10.0	17.0	15.0	16.0	14.0	17.5	13.0	11.5	10.0
17	8.0	6.5	13.0	8.5	17.5	13.0	17.5	14.0	17.0	12.0	11.0	8.5
18	7.5	5.0	14.0	8.0	17.5	15.5	17.5	14.5	17.5	12.0	11.5	10.0
19	7.0	5.0	15.0	9.0	17.5	13.5	19.0	14.5	17.0	13.0	13.0	11.0
20	6.0	3.5	16.5	10.0	16.0	13.5	18.0	13.5	16.5	12.5	12.5	9.0
21	5.0	3.5	17.5	12.0	14.5	12.5	15.0	11.0	16.5	13.0	11.0	8.5
22	5.0	4.5	17.0	12.0	15.5	12.0	16.0	11.0	16.5	13.0	9.5	7.0
23	5.0	3.0	15.5	12.5	15.0	12.0	16.5	11.5	17.0	14.5	9.5	7.0
24	4.5	2.5	16.0	12.5	14.0	12.0	16.5	13.5	17.5	14.5	10.5	9.0
25	6.0	3.5	15.0	13.5	15.5	12.0	16.5	14.5	16.0	12.5	10.0	10.0
26	6.5	4.5	14.5	12.0	16.5	12.5	16.0	13.0	16.0	14.0	11.5	10.0
27	6.0	5.0	16.0	9.5	17.5	13.5	16.5	12.0	17.0	14.0	11.0	8.5
28	6.5	5.0	14.5	10.5	16.0	15.0	17.0	13.0	16.5	12.5	9.5	7.5
29	9.0	4.5	17.0	12.0	17.0	15.0	17.5	12.0	16.5	14.5	9.0	8.0
30	9.0	6.5	15.0	12.5	17.5	14.0	16.5	13.5	16.5	15.0	8.0	7.5
31	---	---	15.5	11.0	---	---	19.5	14.0	17.5	15.5	---	---
MONTH	9.0	.5	17.5	5.0	19.0	11.5	22.0	11.0	19.5	12.0	17.0	7.0

04044400 CARP RIVER NEAR NEGAUNEE, MI

LOCATION.--Lat 46°31'29", long 87°34'25", in SE¼ sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, on right bank 30 ft (9 m) downstream from bridge on U.S. Highway 41, and 2.0 mi (3.2 km) northeast of Negaunee.

DRAINAGE AREA.--51.4 mi² (133.1 km²).

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft (402.306 m) Michigan Department of Highway and Transportation datum. Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft or 27.7 hm³) 5 mi (8 km) upstream. The city of Ishpeming diverted an average of 2.3 ft³/s (0.065 m³/s) into basin as waste effluent (station 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 61.0 ft³/s (1.728 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 351 ft³/s (9.94 m³/s) June 27, 28, 1968, gage height, 4.68 ft (1.426 m); maximum gage height, 5.24 ft (1.597 m) Mar. 2, 1972, backwater from ice; minimum discharge, 3.7 ft³/s (0.10 m³/s) July 29, 1965; minimum gage height, 1.94 ft (0.591 m) Aug. 1, 1962; minimum daily discharge, 3.9 ft³/s (0.11 m³/s) July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 134 ft³/s (3.79 m³/s) June 15, 16, gage height, 3.54 ft (1.079 m); maximum gage height, 3.80 ft (1.158 m) Dec. 12, backwater from ice; minimum, 11 ft³/s (0.31 m³/s) Feb. 2, gage height, 2.20 ft (0.671 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	79	73	67	46	50	109	42	36	62	42	47
2	47	78	73	57	32	50	103	41	36	57	44	47
3	66	77	72	65	48	50	112	53	49	56	43	48
4	68	77	72	63	48	49	122	90	75	56	46	49
5	65	77	72	62	46	50	96	122	51	55	46	48
6	64	76	71	60	46	48	73	78	42	54	46	49
7	62	77	73	39	46	47	75	59	39	53	58	52
8	61	76	75	55	46	47	82	51	68	53	60	55
9	61	80	74	54	46	47	76	48	56	53	55	53
10	60	80	76	52	46	43	90	47	43	52	56	51
11	61	77	75	50	40	30	109	46	40	52	55	50
12	67	77	74	50	50	30	76	42	45	53	52	49
13	69	83	72	50	50	30	69	41	39	53	49	49
14	66	84	69	50	50	30	69	41	65	52	47	48
15	64	81	69	50	52	30	58	39	109	53	47	49
16	62	85	69	50	55	30	54	38	106	52	46	51
17	63	77	70	50	60	30	55	38	61	53	46	54
18	63	76	70	50	56	28	51	37	46	53	47	53
19	62	75	33	50	53	32	46	37	40	53	46	52
20	61	75	75	49	53	30	43	37	44	53	46	51
21	61	76	75	47	52	29	41	36	50	55	45	51
22	61	75	74	47	52	30	42	36	44	52	45	51
23	61	76	72	46	54	30	88	36	56	47	45	51
24	71	76	71	46	54	31	100	40	60	44	44	51
25	93	75	71	46	54	33	68	41	59	44	44	50
26	93	73	70	46	53	36	57	55	56	44	47	50
27	85	73	70	46	51	38	52	47	54	44	49	52
28	82	73	70	46	52	50	53	41	55	43	49	52
29	81	73	68	46	---	77	49	39	78	43	48	51
30	80	73	67	46	---	91	45	38	73	43	48	52
31	79	---	67	46	---	93	---	36	---	42	47	---
TOTAL	2067	2310	2182	1581	1391	1319	2163	1472	1675	1579	1488	1516
MEAN	66.7	77.0	70.4	51.0	49.7	42.5	72.1	47.5	55.8	50.9	48.0	50.5
MAX	93	85	76	67	60	93	122	122	109	62	60	55
MIN	28	73	33	39	32	28	41	36	36	42	42	47

CAL YR 1980 TOTAL 20935 MEAN 57.2 MAX 136 MIN 19
WTR YR 1981 TOTAL 20743 MEAN 56.8 MAX 122 MIN 28

04044563 BIG CREEK NEAR HARVEY, MI

LOCATION.--Lat 46°26'04", long 87°19'04", in SE¼ SW¼ sec.28, T.47 N., R.24 W., Marquette County, Hydrologic Unit 04020201, on left bank 5 ft (2 m) upstream from culverts on county highway, 5.0 mi (8.0 km) southeast of Harvey.

DRAINAGE AREA.--17.0 mi² (44.0 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1964-70. June 1979 to September 1981 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 670 ft (204 m) from topographic map (nearest 10 ft). Oct. 25, 1963 to June 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Dec. 19 to Jan. 27, which are fair. Water quality data for 1981 water year published under "Analyses of samples collected at miscellaneous sites".

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 147 ft³/s (4.16 m³/s) revised, June 17, 1979, gage height, 4.79 ft (1.460 m); minimum observed, 23 ft³/s (0.65 m³/s) Sept. 8, 1966, discharge measurement.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 112 ft³/s (3.17 m³/s) Apr. 23, gage height, 4.20 ft (1.280 m); minimum, 24 ft³/s (0.68 m³/s) Feb. 3, gage height, 2.32 ft (0.707 m) but may have been less during period of no gage-height record Dec. 19 to Jan. 27.

REVISIONS.--The maximum discharges for the water years 1979 and 1980 have been revised to 147 ft³/s (4.16 m³/s) June 17, 1979, gage height, 4.79 ft (1.460 m), and 111 ft³/s (3.14 m³/s) Apr. 9, 1980, gage height, 4.18 ft (1.274 m), superseding figures published in the report for 1980.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	29	30	29	29	31	43	30	30	29	37	29
2	29	29	30	29	28	30	40	30	30	29	37	29
3	29	29	30	29	27	30	40	37	41	28	29	29
4	29	29	30	29	29	30	52	45	35	28	35	28
5	29	29	30	29	28	30	37	47	31	28	29	29
6	28	29	31	29	28	29	34	34	30	28	28	29
7	28	29	32	29	28	29	36	31	30	28	29	31
8	28	29	34	29	28	30	37	30	32	28	28	31
9	28	32	32	29	28	29	34	30	29	28	35	29
10	28	30	31	29	28	29	35	30	29	28	33	28
11	30	29	29	29	27	30	34	30	29	28	30	33
12	31	30	30	29	27	30	32	29	29	28	29	32
13	31	36	30	29	28	30	32	29	29	28	29	29
14	30	35	29	29	27	30	37	29	45	28	29	28
15	29	30	29	29	28	30	32	29	44	29	28	28
16	29	29	29	29	29	30	32	29	36	29	28	31
17	30	29	29	29	30	30	32	29	31	31	28	35
18	29	29	29	29	33	30	31	29	29	30	28	31
19	29	29	29	29	33	30	31	29	28	29	28	29
20	29	29	29	29	32	29	30	29	31	32	28	29
21	29	30	29	30	31	30	30	29	30	31	28	29
22	29	30	29	30	32	30	32	28	29	29	28	29
23	29	30	29	30	34	31	65	29	29	29	28	28
24	29	30	29	30	33	31	43	29	29	29	28	29
25	35	29	29	30	31	32	34	29	28	31	28	29
26	30	30	29	30	30	34	33	31	28	29	31	29
27	29	30	29	29	30	33	32	29	28	29	29	29
28	29	30	29	29	32	38	33	29	28	29	29	28
29	29	30	29	29	---	44	31	30	37	29	30	28
30	29	30	29	28	---	46	31	30	32	29	29	29
31	29	---	29	28	---	40	---	29	---	29	29	---
TOTAL	908	898	921	903	828	985	1075	957	946	897	922	884
MEAN	29.3	29.9	29.7	29.1	29.6	31.8	35.8	30.9	31.5	28.9	29.7	29.5
MAX	35	36	34	30	34	46	65	47	45	32	37	35
MIN	28	29	29	28	27	29	30	28	28	28	28	28
CFSM	1.72	1.76	1.75	1.71	1.74	1.87	2.11	1.82	1.85	1.70	1.75	1.74
IN.	1.99	1.96	2.02	1.98	1.81	2.16	2.35	2.09	2.07	1.96	2.02	1.93

CAL YR 1980 TOTAL 11149 MEAN 30.5 MAX 82 MIN 27 CFSM 1.79 IN 24.40
WTR YR 1981 TOTAL 11124 MEAN 30.5 MAX 65 MIN 27 CFSM 1.79 IN 24.34

04044573 CEDAR CREEK NEAR HARVEY, MI

LOCATION.--Lat 46°27'20", long 87°21'42", in NW¼ SW¼ sec.19, T.47 N., R.24 W., Marquette County, Hydrologic Unit 04020201, on right bank 60 ft (18 m) upstream from man-made rock dam, 0.3 mi (0.5 km) upstream from county highway and 2.5 mi (4.0 km) south of Harvey.

DRAINAGE AREA.--9.04 mi^2 (23.41 km^2).

PERIOD OF RECORD.--June 1979 to September 1981 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage-height record, Dec. 21 to Mar. 9, and those above 20 ft^3/s (0.57 m^3/s), which are fair. Water quality data for 1981 water year published under "Analyses for samples collected at miscellaneous sites".

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34 ft^3/s (0.96 m^3/s) July 30, 1979, gage height, 1.27 ft (0.387 m); minimum, 11 ft^3/s (0.31 m^3/s) on many days.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 10.2 ft^3/s (0.29 m^3/s) was measured July 21, 1964, at site 0.3 mi (0.5 km) downstream, drainage area, 9.17 mi^2 (23.75 km^2).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 25 ft^3/s (0.71 m^3/s) Apr. 23; maximum gage height, 1.13 ft (0.344 m) Oct. 11, 24, 25, Apr. 23; minimum discharge, 11 ft^3/s (0.31 m^3/s) on many days during April and June.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	16	14	12	12	13	13	12	12	12	14	13
2	14	16	14	12	12	13	12	12	12	12	13	13
3	15	16	14	12	12	13	12	13	14	12	13	12
4	15	15	14	12	12	13	15	14	12	12	13	12
5	15	15	14	12	12	13	12	13	12	12	13	12
6	15	15	14	12	12	13	12	12	12	12	12	12
7	15	15	14	12	12	13	12	12	12	12	12	13
8	16	15	14	12	12	13	12	12	12	12	12	12
9	16	15	14	12	12	13	12	12	12	12	16	12
10	17	14	14	12	12	13	12	12	12	12	14	12
11	18	14	13	12	12	13	12	12	12	12	13	12
12	19	14	13	12	12	13	11	12	12	12	13	12
13	18	15	13	12	12	13	11	12	12	12	13	12
14	18	14	12	12	12	13	12	12	15	12	13	12
15	17	14	12	12	12	13	11	12	13	12	13	12
16	17	13	12	12	12	12	11	12	12	12	13	13
17	18	13	12	12	13	12	11	13	12	12	12	13
18	17	13	12	12	14	12	11	13	12	12	12	13
19	16	13	12	12	14	12	11	13	12	12	13	12
20	16	13	12	12	14	12	11	12	12	12	13	12
21	16	14	12	13	13	13	11	12	12	13	13	12
22	16	14	12	13	13	13	11	12	12	12	13	12
23	16	14	12	13	14	12	16	12	11	12	13	12
24	17	14	12	13	14	12	12	13	12	12	13	12
25	18	14	12	13	14	12	11	13	12	12	13	12
26	17	14	12	13	13	12	11	12	12	12	13	12
27	17	14	12	13	13	12	11	12	12	12	13	12
28	16	14	12	13	13	13	12	12	12	12	13	12
29	16	14	12	12	---	13	12	12	13	12	13	12
30	16	14	12	12	---	14	12	12	12	12	13	13
31	16	---	12	12	---	13	---	12	---	12	13	---
TOTAL	507	428	395	380	354	394	355	381	366	373	403	367
MEAN	16.4	14.3	12.7	12.3	12.6	12.7	11.8	12.3	12.2	12.0	13.0	12.2
MAX	19	16	14	13	14	14	16	14	15	13	16	13
MIN	14	13	12	12	12	12	11	12	11	12	12	12
CFSM	1.81	1.58	1.41	1.36	1.39	1.41	1.31	1.36	1.35	1.33	1.44	1.35
IN.	2.09	1.76	1.63	1.56	1.46	1.62	1.46	1.57	1.51	1.53	1.66	1.51

CAL YR 1980 TOTAL 4733 MEAN 12.9 MAX 20 MIN 11 CFSM 1.43 IN 19.47
WTR YR 1981 TOTAL 4703 MEAN 12.9 MAX 19 MIN 11 CFSM 1.43 IN 19.35

04044583 CHERRY CREEK NEAR HARVEY, MI

LOCATION.--Lat 46°27'57", long 87°21'53", in NE¼ SE¼ sec.13, T.47 N., R.25 W., Marquette County, Hydrologic Unit 04020201, on left bank 0.5 mi (0.8 km) upstream from County Highway 551, 2.0 mi (3.2 km) south of Harvey.

DRAINAGE AREA.--4.53 mi² (11.73 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1971-79. October 1965 to September 1970, June 1979 to September 1981 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 670 ft (204 m) from topographic map (nearest 10 ft). Oct. 7, 1970 to May 23, 1979, nonrecording gage at same site and datum.

REMARKS.--Records good. Water quality data for 1981 water year published under "Analyses of samples collected at miscellaneous sites".

AVERAGE DISCHARGE.--7 years, (water years 1966-70, 1980-81), 19.1 ft³/s (0.541 m³/s), 57.26 in/yr (1,454 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 37 ft³/s (1.04 m³/s) May 30, 1970; maximum gage height, 4.28 ft (1.305 m) Dec. 4, 1980, backwater from debris; minimum discharge, 16 ft³/s (0.45 m³/s) Jan. 25, 1967; minimum gage height, 2.24 ft (0.683 m) July 28, 1970 (stop logs removed).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 27 ft³/s (0.76 m³/s) Apr. 23, gage height, 3.75 ft (1.143 m); minimum daily, 18 ft³/s (0.51 m³/s) Sept. 12-15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	20	20	20	20	20	20	20	20	20	19	19
2	20	20	20	20	20	20	20	20	20	20	19	19
3	20	20	20	20	20	20	20	21	21	20	19	19
4	20	20	20	20	20	20	21	21	20	20	19	19
5	20	20	20	20	20	20	20	21	20	20	19	19
6	20	20	20	20	20	20	20	20	20	20	19	19
7	20	20	20	20	20	20	20	20	20	20	19	20
8	20	20	20	20	20	20	20	20	20	20	19	19
9	20	20	20	20	20	20	20	20	20	20	20	19
10	20	20	20	20	20	20	20	20	20	20	19	19
11	21	20	20	20	20	20	20	20	20	20	19	19
12	21	20	20	20	20	20	20	20	20	20	19	18
13	21	21	20	20	20	20	20	20	20	20	19	18
14	20	20	20	20	20	20	20	20	21	20	19	18
15	20	20	20	20	20	20	20	20	20	20	19	18
16	20	20	20	20	20	20	20	20	20	20	19	19
17	20	20	20	20	20	20	20	20	20	20	19	20
18	20	20	20	20	20	20	20	20	20	20	19	19
19	20	20	20	20	20	20	20	20	20	20	19	19
20	20	20	20	20	20	20	20	20	20	20	19	19
21	20	20	20	20	20	20	20	20	20	20	19	19
22	20	20	20	20	20	20	20	20	20	20	19	19
23	20	20	20	20	20	20	22	20	20	20	19	19
24	21	20	20	20	20	20	20	20	20	20	19	19
25	21	20	20	20	20	20	20	20	20	20	19	19
26	20	20	20	20	20	20	20	20	20	20	19	19
27	20	20	20	20	20	20	20	20	20	19	19	19
28	20	20	20	20	20	20	20	20	20	20	19	19
29	20	20	20	20	---	20	20	20	20	20	19	19
30	20	20	20	20	---	21	20	20	20	19	19	20
31	20	---	20	20	---	20	---	20	---	19	19	---
TOTAL	625	601	620	620	560	621	603	623	602	617	590	569
MEAN	20.2	20.0	20.0	20.0	20.0	20.0	20.1	20.1	20.1	19.9	19.0	19.0
MAX	21	21	20	20	20	21	22	21	21	20	20	20
MIN	20	20	20	20	20	20	20	20	20	19	19	18
CFSM	4.46	4.42	4.42	4.42	4.42	4.42	4.44	4.44	4.44	4.39	4.19	4.19
IN.	5.13	4.93	5.09	5.09	4.60	5.10	4.95	5.11	4.94	5.07	4.84	4.67

CAL YR 1980 TOTAL 7302 MEAN 20.0 MAX 23 MIN 19 CFSM 4.42 IN 59.95
WTR YR 1981 TOTAL 7251 MEAN 19.9 MAX 22 MIN 18 CFSM 4.39 IN 59.53

04044595 SILVER CREEK AT HARVEY, MI

LOCATION.--Lat 46°29'24", long 87°22'19", in NW¼ NE¼ sec.12, T.47 N., R.25 W., Marquette County, Hydrologic Unit 04020201, on right bank 15 ft (5 m) upstream from culverts on Silver Creek Road, 0.8 mi (1.3 km) southwest of Harvey.

DRAINAGE AREA.--8.58 mi² (22.22 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1962-64. June 1979 to September 1981 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 660 ft (201 m) from topographic map (nearest 10 ft). Aug. 23, 1962 to Nov. 19, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Dec. 17 to Jan. 27, which are fair. Water quality data for 1981 water year published under "Analyses for samples collected at miscellaneous sites".

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 40 ft³/s (1.13 m³/s) Apr. 9, 1980, gage height, 3.51 ft (1.070 m); minimum observed, 7.0 ft³/s (0.20 m³/s) Nov. 19, 1964, discharge measurement.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 36 ft³/s (1.02 m³/s) Apr. 23, gage height, 3.41 ft (1.039 m); minimum, 8.5 ft³/s (0.24 m³/s) June 26, 27, Aug. 20, 21, 22, 23, 25; minimum gage height, 2.53 ft (0.771 m) on many days in July and August.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.9	9.0	8.7	8.8	8.9	9.2	13	9.3	9.0	8.6	8.9	8.8
2	8.9	9.0	8.7	8.8	8.9	9.2	11	9.3	8.8	8.7	8.8	8.8
3	8.9	9.0	8.7	8.8	8.9	9.2	11	11	11	8.7	8.8	8.8
4	8.8	9.0	8.7	8.8	8.9	9.2	17	15	9.6	8.7	9.1	8.8
5	8.8	9.0	8.7	8.8	8.9	9.2	11	19	9.0	8.8	8.7	8.8
6	8.9	8.9	8.7	8.8	8.9	9.2	9.7	11	8.9	8.7	8.6	8.8
7	8.9	8.9	8.8	8.8	8.9	9.2	10	9.8	9.3	8.7	8.8	9.2
8	9.1	9.0	8.9	8.8	8.9	9.2	10	9.5	9.0	8.7	8.7	9.0
9	9.0	9.2	8.7	8.8	9.0	9.2	9.5	9.4	8.9	8.7	10	8.8
10	9.1	8.9	8.7	8.8	9.0	9.2	10	9.3	8.8	8.7	9.2	8.8
11	9.5	8.8	8.7	8.8	9.0	9.2	9.7	9.3	8.8	8.8	8.9	9.0
12	9.5	9.0	8.7	8.8	9.0	9.2	9.2	9.3	8.7	8.9	8.8	8.8
13	9.4	9.4	8.7	8.8	9.0	9.2	9.2	9.2	9.3	8.8	8.7	8.8
14	9.2	9.1	8.7	8.8	9.0	9.2	9.5	9.2	10	8.9	8.7	8.9
15	9.2	8.9	8.7	8.8	9.0	9.2	9.2	9.2	9.8	9.0	8.7	8.8
16	9.2	8.8	8.8	8.8	9.0	9.2	9.2	9.2	9.0	9.0	8.7	9.0
17	9.5	8.8	8.8	8.8	9.3	9.2	9.2	9.1	8.9	9.0	8.7	8.9
18	9.6	8.8	8.8	9.0	9.5	9.2	9.2	9.1	8.8	9.1	8.7	8.9
19	9.3	8.8	8.8	9.2	9.3	9.2	9.2	9.1	8.8	9.0	8.7	8.9
20	9.3	8.8	8.8	9.2	9.2	9.2	9.3	9.1	9.0	9.1	8.6	9.0
21	9.3	8.9	8.8	9.0	9.2	9.2	9.3	9.0	8.9	9.0	8.6	9.0
22	9.2	8.9	8.8	9.0	9.2	9.2	9.4	9.0	8.8	8.9	8.6	9.1
23	9.2	8.9	8.8	9.2	9.4	9.4	23	9.0	8.8	8.8	8.6	9.0
24	9.4	8.8	8.8	9.2	9.5	9.6	14	9.1	8.8	8.8	8.7	9.1
25	9.8	8.7	8.8	9.2	9.4	9.8	10	9.0	8.7	9.1	8.7	9.2
26	9.3	8.8	8.8	9.0	9.3	10	9.9	9.1	8.6	8.9	8.7	9.2
27	9.1	8.8	8.8	8.9	9.3	10	9.7	9.0	8.6	8.8	8.6	9.2
28	9.1	8.9	8.8	8.9	9.3	12	9.6	8.9	8.8	8.8	8.6	9.3
29	9.1	8.8	8.8	8.9	---	14	9.5	9.0	8.9	8.8	8.7	9.3
30	9.1	8.8	8.8	8.8	---	17	9.3	8.9	8.6	8.8	8.7	9.5
31	9.0	---	8.8	8.8	---	13	---	8.9	---	8.7	8.8	---
TOTAL	284.6	267.4	271.6	275.9	255.1	307.2	318.8	303.3	270.9	274.0	272.3	269.5
MEAN	9.18	8.91	8.76	8.90	9.11	9.91	10.6	9.78	9.03	8.84	8.78	8.98
MAX	9.8	9.4	8.9	9.2	9.5	17	23	19	11	9.1	10	9.5
MIN	8.8	8.7	8.7	8.8	8.9	9.2	9.2	8.9	8.6	8.6	8.6	8.8
CFSM	1.07	1.04	1.02	1.04	1.06	1.16	1.24	1.14	1.05	1.03	1.02	1.05
IN.	1.23	1.16	1.18	1.20	1.11	1.33	1.38	1.31	1.17	1.19	1.18	1.17

CAL YR 1980 TOTAL 3534.6 MEAN 9.66 MAX 36 MIN 8.7 CFSM 1.13 IN 15.32
WTR YR 1981 TOTAL 3370.6 MEAN 9.23 MAX 23 MIN 8.6 CFSM 1.08 IN 14.61

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 46°34'30", long 85°16'10", in NE¼ sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi (1.1 km) upstream from Tahquamenon (Big) Falls, 11.5 mi (18.5 km) west of Tahquamenon Paradise, and 19 mi (31 km) northeast of Newberry.

DRAINAGE AREA.--790 mi² (2,046 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft (212.4 m) from river-profile map (nearest ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--28 years, 936 ft³/s (26.51 m³/s), 16.09 in/yr (409 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft³/s (198 m³/s) May 10, 1960, gage height, 10.26 ft (3.127 m); minimum, 157 ft³/s (4.45 m³/s) July 26, 1955; minimum gage height, 2.86 ft (0.872 m) July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,730 ft³/s (134 m³/s) Apr. 6, 7, gage height, 8.74 ft (2.664 m); minimum, 248 ft³/s (7.02 m³/s) Aug. 28, gage height, 3.16 ft (0.963 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	710	755	720	403	407	1010	2500	1460	390	919	309	383
2	669	741	674	407	407	1010	2900	1320	390	962	427	443
3	644	710	560	407	411	1010	3500	1150	390	948	518	498
4	612	669	544	403	415	982	4300	1040	444	898	643	495
5	584	644	556	399	411	958	4500	1010	512	874	863	474
6	556	620	556	392	407	920	4650	1090	517	822	892	446
7	548	600	552	396	407	904	4700	1130	533	737	883	420
8	521	588	560	396	407	882	4690	1140	593	641	870	402
9	513	568	556	396	411	860	4680	1090	693	539	823	420
10	498	576	502	396	403	838	4620	1030	722	477	795	414
11	475	592	445	396	411	822	4500	976	727	427	780	418
12	479	584	418	392	411	806	4380	907	706	374	743	416
13	494	604	418	388	407	795	4230	842	685	337	679	420
14	506	710	418	385	399	785	4040	761	678	315	630	406
15	502	806	415	385	399	765	3970	693	751	304	565	389
16	494	850	415	381	396	746	3810	631	859	289	521	371
17	521	860	415	385	407	718	3610	584	1000	321	483	355
18	556	844	403	381	434	700	3370	538	1080	481	441	352
19	600	811	399	385	494	678	3190	502	1080	585	401	331
20	632	775	392	385	552	664	2950	477	1070	598	368	328
21	656	750	388	388	600	648	2780	436	1020	556	343	321
22	696	770	388	388	640	652	2540	424	946	514	322	312
23	736	755	392	388	718	678	2340	394	885	465	302	309
24	705	795	392	392	822	741	2220	373	807	408	289	304
25	682	855	392	396	888	833	2140	368	710	371	284	298
26	723	844	388	399	934	960	2040	361	657	366	271	303
27	790	811	385	399	970	1040	1920	365	602	356	262	310
28	816	790	385	407	1000	1200	1810	370	534	341	257	305
29	828	765	385	407	---	1380	1700	375	551	327	268	316
30	828	741	392	407	---	1680	1580	364	772	320	307	317
31	785	---	396	407	---	2050	---	392	---	308	351	---
TOTAL	19359	21791	14209	12236	14968	28703	100160	22593	21304	16180	15890	11276
MEAN	624	726	458	395	535	926	3339	729	710	522	513	376
MAX	828	860	720	407	1000	2050	4700	1460	1080	962	892	498
MIN	475	568	385	381	396	648	1580	361	390	289	257	298
CFSM	.79	.92	.58	.50	.68	1.17	4.23	.92	.90	.66	.65	.48
IN.	.91	1.03	.67	.58	.70	1.35	4.72	1.06	1.00	.76	.75	.53

CAL YR 1980 TOTAL 273977 MEAN 749 MAX 4230 MIN 231 CFSM .95 IN 12.90
WTR YR 1981 TOTAL 298669 MEAN 818 MAX 4700 MIN 257 CFSM 1.04 IN 14.06

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--In addition to water-quality monitor, samples are collected periodically by a local observer. Monthly samples are collected as a cross-section sample at cableway 40 ft (12 m) downstream from gage or by wading 300 ft (91 m) to 1000 ft (305 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976-81), 238 micromhos Jan. 24, 1977; minimum (water years 1976, 1978-81), 34 micromhos Apr. 17, 18, 1976.
WATER TEMPERATURES (water years 1976-81): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum recorded, 184 micromhos Feb. 10, Sept. 2, 3; minimum observed, 51 micromhos Apr. 7.
WATER TEMPERATURES: Maximum, 26.0°C July 11, 13; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
08...	0920	524	151	7.6	9.0	9.7	86	K8	K3	72	18	20
NOV												
06...	1315	668	134	7.3	3.5	11.7	91	K2	K6	63	26	17
DEC												
09...	1100	556	152	7.3	.0	10.5	74	K2	<2	71	5	19
JAN												
06...	1410	392	--	7.5	.0	7.3	52	K4	<1	81	2	23
FEB												
10...	1515	419	184	7.3	.0	7.5	52	K4	<1	87	10	23
MAR												
04...	1500	980	130	7.0	.0	--	--	K4	K1	62	14	17
APR												
07...	1120	4710	51	7.0	3.0	10.2	78	K3	<2	25	9	6.9
MAY												
05...	1340	1010	99	7.3	11.0	8.4	77	K5	K2	49	10	14
JUN												
09...	1230	696	148	7.7	18.5	7.9	87	44	26	78	12	22
JUL												
08...	1305	640	126	7.6	24.5	5.8	71	23	42	67	10	19
AUG												
11...	1220	756	120	7.4	20.0	5.4	61	31	140	67	12	18
SEP												
08...	1340	396	173	7.8	18.5	7.4	80	K19	K22	85	4	24

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCT/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
08...	5.4	1.9	5	.1	.7	--	80	0	66	2.6	14
NOV											
06...	4.9	1.6	5	.1	.9	--	64	0	52	3.6	15
DEC											
09...	5.6	1.8	5	.1	.6	--	81	0	66	6.5	14
JAN											
06...	5.8	1.7	4	.1	.8	--	96	0	79	4.9	13
FEB											
10...	7.2	2.4	6	.1	.8	.60	94	0	77	7.5	12
MAR											
04...	4.7	1.8	6	.1	1.1	.80	59	0	48	9.4	12
APR											
07...	2.0	1.0	8	.1	.9	.70	20	0	16	3.2	7.5
MAY											
05...	3.3	2.0	8	.1	.7	.50	47	0	39	3.8	9.6
JUN											
09...	5.6	1.7	4	.1	.7	.50	80	0	66	2.4	9.7
JUL											
08...	4.8	3.2	9	.2	.6	.40	70	0	57	2.7	6.9
AUG											
11...	5.3	1.8	5	.1	.7	.50	67	0	55	3.9	8.6
SEP											
08...	6.2	1.9	5	.1	.6	--	99	0	81	2.4	6.7

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)
OCT 08...	1.9	.1	7.7	118	85	167	.07	.07	.050	.050	.06
NOV 06...	2.1	.0	6.9	105	71	184	.08	.08	.060	.040	.05
DEC 09...	1.9	.1	8.3	106	92	159	.13	.13	.050	.000	.00
JAN 06...	2.5	.0	9.8	114	105	121	.17	.17	.050	.050	.06
FEB 10...	1.8	<.1	12	119	106	135	.17	.16	.080	.070	.09
MAR 04...	2.0	<.1	8.0	106	73	280	.31	.31	.050	.050	.06
APR 07...	1.7	<.1	4.7	50	35	636	.09	.09	.040	.040	.05
MAY 05...	1.6	<.1	3.3	82	58	224	.04	.04	.050	.030	.04
JUN 09...	1.6	<.1	4.3	99	83	186	.12	.08	.050	.050	.06
JUL 08...	1.9	<.1	5.7	113	77	195	.06	.06	.020	.010	.01
AUG 11...	1.8	<.1	8.0	119	74	243	.05	.05	.030	.030	.04
SEP 08...	1.8	<.1	8.0	120	95	128	.05	.05	.030	.020	.03

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 08...	.42	.47	.54	2.4	.030	.09	.000	--	6	8.5	100
NOV 06...	.28	.34	.42	1.9	.020	.06	.010	16	4	7.0	100
DEC 09...	.23	.28	.41	1.8	.010	.03	.010	8.9	6	9.0	100
JAN 06...	.13	.18	.35	1.6	.030	.09	.020	--	3	3.2	100
FEB 10...	.26	.34	.51	2.3	.080	.25	.060	8.0	--	--	--
MAR 04...	.25	.30	.61	2.7	.020	.06	.020	13	3	7.9	100
APR 07...	.32	.36	.45	2.0	.030	.09	<.010	--	12	153	100
MAY 05...	.45	.50	.54	2.4	--	.03	.020	15	4	11	100
JUN 09...	.44	.49	.61	2.7	<.010	.03	<.010	12	6	11	100
JUL 08...	.73	.75	.81	--	--	.03	.020	--	7	12	100
AUG 11...	.96	.99	1.0	4.6	.030	.09	.010	25	6	12	100
SEP 08...	.36	.39	.44	1.9	<.010	--	<.010	8.5	5	5.3	100

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT											
08...	0920	1	0	100	40	--	3	10	<10	0	0
JAN											
06...	1410	1	1	100	20	--	3	10	10	0	0
APR											
07...	1120	0	0	<50	10	0	0	10	<10	1	0
JUL											
08...	1305	2	2	--	60	1	<1	10	<10	1	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT										
08...	--	4	600	220	1	0	30	20	.4	.3
JAN										
06...	15	7	620	290	15	0	50	40	.4	.2
APR										
07...	3	2	550	280	7	0	40	10	1.2	.4
JUL										
08...	6	2	970	700	10	1	50	40	.2	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT										
08...	5	0	0	0	0	0	20	8	14	.5
JAN										
06...	7	3	0	0	1	0	40	20	7.4	.3
APR										
07...	1	0	0	0	0	0	40	10	15	.1
JUL										
08...	--	2	0	0	0	0	40	10	18	.4

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)
NOV											
06...	1315	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)
NOV										
06...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 7,80	MAR 4,81	MAY 5,81	JUN 9,81
TIME	1315	1500	1340	1230
TOTAL CELLS/ML	13	13	130	1100
DIVERSITY: DIVISION	0.0	0.0	0.0	0.7
.CLASS	0.0	0.0	0.0	0.7
..ORDER	0.0	0.0	0.9	0.9
...FAMILY	0.0	0.0	1.2	1.0
....GENUS	0.0	0.0	1.2	1.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	64	6
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
...VOLVOCACEAE								
....PANDORINA	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	90#	70	13	1
....MELOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	13#	100	--	-	--	-	--	-
....COCCONEIS	--	-	13#	100	--	-	--	-
...EUNOTIACEAE								
....EUNOTIA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	26#	20	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	13	10	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	13	1
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	--	-	26	2
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
...SYNURACEAE								
....MALLOMONAS	--	-	--	-	--	-	--	-
....SYNURA	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	--	-	39	4
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	930#	85
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	13	1

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 8,81	AUG 11,81	SEP 8,81
TIME	1305	1220	1340
TOTAL CELLS/ML	170	220	1100
DIVERSITY: DIVISION	1.4	1.6	1.6
.CLASS	1.4	1.6	2.1
..ORDER	1.4	1.8	2.5
...FAMILY	1.4	2.9	2.8
....GENUS	1.4	3.2	3.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	28	13	42	4
....KIRCHNERIELLA	--	-	--	-	28	2
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	13	8	28	13	14	1
...VOLVOCACEAE						
....PANDORINA	--	-	--	-	110	10
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	120#	69	--	-	130	11
....MELOSIRA	--	-	--	-	28	2
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	14	6	--	-
....COCCONEIS	--	-	--	-	--	-
...EUNOTIACEAE						
....EUNOTIA	--	-	--	-	28	2
...FRAGILARIACEAE						
....FRAGILARIA	--	-	41#	19	--	-
....SYNEDRA	--	-	28	13	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	--	-	--	-
...NAVICULACEAE						
....NAVICULA	--	-	14	6	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	14	6	56	5
...TABELLARIACEAE						
....TABELLARIA	--	-	14	6	--	-
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...OCHROMONADACEAE						
....OCHROMONAS	--	-	--	-	400#	35
...SYNURACEAE						
....MALLOMONAS	--	-	--	-	14	1
....SYNURA	--	-	--	-	42	4
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	13	8	--	-	170	15
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	26#	15	28	13	84	7
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	14	6	--	-
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GLENODINIACEAE						
....GLENODINIUM	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	146	144	145	127	124	125	133	126	128	177	176	177
2	150	147	148	125	124	125	143	134	138	176	174	175
3	149	147	148	125	123	124	146	144	145	174	172	172
4	148	147	147	126	121	124	149	145	148	174	171	172
5	150	147	149	127	124	126	151	149	149	174	174	174
6	153	149	151	128	127	127	149	147	148	175	173	174
7	156	153	154	130	128	129	152	149	151	174	173	174
8	159	153	156	135	131	132	151	150	150	173	171	172
9	161	159	160	132	131	131	162	151	158	171	171	171
10	161	159	160	138	133	135	167	161	164	171	169	170
11	161	159	160	143	134	138	165	161	163	170	169	169
12	162	159	160	141	139	139	161	159	160	170	169	169
13	160	158	159	139	134	137	160	159	159	170	169	170
14	161	160	160	137	134	135	161	158	160	170	169	170
15	161	159	160	137	128	134	166	161	163	171	169	170
16	163	158	161	137	130	134	170	166	168	171	171	171
17	163	155	158	137	134	135	171	169	170	171	171	171
18	158	156	157	140	138	139	170	169	169	172	171	171
19	158	156	157	138	128	134	170	168	169	173	171	172
20	156	150	153	135	126	130	172	170	171	173	172	173
21	151	148	150	128	126	127	172	172	172	174	173	173
22	154	150	152	132	126	128	172	171	171	174	173	173
23	154	146	151	129	127	128	174	171	172	175	174	175
24	146	140	143	130	126	128	175	173	175	175	174	175
25	139	133	136	128	124	126	179	178	179	175	162	172
26	133	129	131	131	121	124	179	178	179	171	160	165
27	129	127	128	129	123	127	179	177	178	---	---	---
28	128	127	128	130	128	130	181	178	180	---	---	---
29	131	127	129	132	128	130	180	180	180	---	---	---
30	132	129	131	131	124	128	179	177	177	---	---	---
31	130	126	128	---	---	---	177	176	176	---	---	---
MONTH	163	126	149	143	121	130	181	126	164			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	---	---	---	95	90	93
2				---	---	---	---	---	---	97	95	96
3				---	---	---	---	---	---	98	97	98
4				113	111	112	---	---	---	99	98	98
5				116	113	114	---	---	---	99	95	97
6				115	113	114	---	---	---	95	92	94
7				116	115	115	55	53	54	91	89	90
8				116	115	115	58	55	57	101	92	97
9				116	115	116	61	58	59	103	100	102
10				---	---	---	62	61	62	102	101	102
11				---	---	---	66	62	64	104	103	104
12				---	---	---	69	66	67	104	103	103
13				---	---	---	70	68	69	107	104	106
14				---	---	---	71	70	70	107	105	106
15				---	---	---	70	69	70	110	107	109
16				---	---	---	70	69	69	114	111	113
17				---	---	---	72	71	72	114	111	112
18				---	---	---	75	73	74	118	115	116
19				---	---	---	75	75	75	121	117	119
20				---	---	---	76	75	75	125	121	123
21				---	---	---	77	75	76	129	125	127
22				---	---	---	80	77	78	133	128	130
23				---	---	---	81	80	81	138	133	136
24				---	---	---	81	78	79	141	137	139
25				---	---	---	78	77	77	146	141	143
26				---	---	---	81	77	79	149	146	147
27				---	---	---	86	81	84	152	148	150
28				---	---	---	87	85	86	155	151	153
29				---	---	---	89	84	87	158	154	156
30				---	---	---	90	86	88	162	157	160
31				---	---	---	---	---	---	166	161	163
MONTH										166	89	119

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	170	167	168	135	121	129	162	159	160	183	181	182
2	170	169	170	121	118	119	158	155	156	184	182	183
3	170	167	169	128	121	126	152	147	150	184	180	183
4	170	168	169	128	127	127	141	131	138	180	178	179
5	173	169	171	128	126	127	123	103	116	178	175	177
6	172	161	168	126	124	125	125	100	107	178	173	175
7	159	148	151	124	122	123	115	108	111	173	171	172
8	149	142	145	127	123	124	125	115	119	175	173	174
9	154	145	149	131	126	129	129	125	127	175	172	174
10	151	132	141	143	139	141	130	127	129	176	172	173
11	132	128	130	154	151	153	127	121	124	175	172	173
12	138	132	135	168	163	165	130	124	127	173	167	170
13	143	138	141	172	168	170	134	130	132	171	166	169
14	142	139	141	172	170	171	137	134	135	173	166	169
15	143	138	140	174	172	173	140	137	138	173	171	172
16	142	139	141	180	176	177	142	137	140	172	171	172
17	140	136	138	175	169	171	144	142	143	173	171	172
18	140	137	139	166	158	162	148	144	146	175	171	173
19	136	134	134	169	166	167	152	148	150	178	171	175
20	133	131	132	171	170	171	155	152	153	178	173	175
21	134	131	132	171	170	170	157	154	155	180	176	178
22	135	133	134	171	169	171	160	156	158	178	173	176
23	134	133	133	169	160	165	161	159	160	177	168	173
24	133	132	132	160	158	159	164	161	163	174	164	170
25	136	133	134	159	157	157	168	165	166	172	166	169
26	139	136	137	157	155	156	169	168	168	173	159	168
27	142	139	140	156	155	155	172	169	171	175	165	169
28	144	142	143	157	156	156	176	171	174	172	162	168
29	145	142	143	161	157	159	180	176	178	174	159	166
30	144	141	143	165	161	163	182	176	181	178	157	167
31	---	---	---	168	161	163	183	180	181	---	---	---
MONTH	173	128	145	180	118	152	183	100	147	184	157	173

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	10.5	10.0	10.5	3.5	3.0	3.0	.5	.0	.0	.0	.0	.0
2	11.0	10.5	10.5	3.0	3.0	3.0	.5	.0	.0	.0	.0	.0
3	10.5	10.0	10.5	3.5	3.0	3.0	.5	.0	.0	.0	.0	.0
4	10.0	9.5	9.5	3.5	3.5	3.5	.0	.0	.0	.0	.0	.0
5	10.0	9.0	9.5	3.5	3.0	3.5	.5	.0	.0	.0	.0	.0
6	10.0	9.5	9.5	4.0	3.0	3.5	.5	.0	.5	.0	.0	.0
7	9.5	9.0	9.0	4.0	3.5	4.0	.0	.0	.0	.0	.0	.0
8	9.5	8.5	9.0	3.5	3.5	3.5	.0	.0	.0	.0	.0	.0
9	9.0	8.5	8.5	3.5	3.0	3.5	.0	.0	.0	.0	.0	.0
10	9.0	8.5	8.5	3.0	2.0	2.5	.5	.0	.0	.0	.0	.0
11	9.0	8.5	9.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
12	8.5	8.5	8.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
13	8.5	8.0	8.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
14	8.5	8.0	8.0	1.0	1.0	1.0	.0	.0	.0	.0	.0	.0
15	8.0	7.5	7.5	1.5	.0	1.0	.0	.0	.0	.0	.0	.0
16	7.5	7.5	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	8.5	7.5	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	8.5	8.0	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	8.0	7.5	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	7.5	7.5	7.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
21	7.5	7.5	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	7.5	6.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	7.0	6.0	6.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
24	6.0	6.0	6.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
25	6.0	6.0	6.0	1.5	.0	1.0	.0	.0	.0	.0	.0	.0
26	6.0	5.5	6.0	1.5	.0	1.0	.0	.0	.0	.0	.0	.0
27	5.5	5.5	5.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
28	5.0	5.0	5.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
29	5.0	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	3.5	3.5	3.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	11.0	3.5	7.5	4.0	.0	1.5	.5	.0	.0	.0	.0	.0

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	---	---	---	9.5	8.0	9.0
2	.0	.0	.0	.0	.0	.0	---	---	---	10.5	9.0	9.5
3	.0	.0	.0	.0	.0	.0	---	---	---	10.5	9.5	10.0
4	.0	.0	.0	.0	.0	.0	---	---	---	10.5	9.5	10.0
5	.0	.0	.0	.0	.0	.0	---	---	---	11.0	10.5	10.5
6	.0	.0	.0	.0	.0	.0	---	---	---	10.5	9.5	10.0
7	.0	.0	.0	.0	.0	.0	4.0	3.5	3.5	12.0	10.0	11.0
8	.0	.0	.0	.0	.0	.0	4.0	4.0	4.0	12.0	11.5	11.5
9	.0	.0	.0	.0	.0	.0	5.0	4.0	4.5	12.0	11.0	11.5
10	.0	.0	.0	.0	.0	.0	6.0	5.0	5.0	11.0	10.5	10.5
11	.0	.0	.0	.0	.0	.0	7.0	5.5	6.0	10.5	10.0	10.5
12	.0	.0	.0	.0	.0	.0	7.5	6.5	7.0	10.0	9.5	10.0
13	.0	.0	.0	.0	.0	.0	8.5	7.5	8.0	9.5	9.0	9.5
14	.0	.0	.0	.0	.0	.0	8.5	7.5	8.0	10.0	9.0	9.5
15	.0	.0	.0	.0	.0	.0	7.5	6.5	7.0	11.0	9.5	10.5
16	.0	.0	.0	.0	.0	.0	7.0	6.5	6.5	12.0	10.5	11.5
17	.0	.0	.0	.0	.0	.0	7.5	7.0	7.5	12.5	11.0	12.0
18	.0	.0	.0	.0	.0	.0	8.0	7.5	7.5	13.5	11.5	12.5
19	.0	.0	.0	.0	.0	.0	8.0	7.5	7.5	14.0	12.5	13.5
20	.0	.0	.0	.0	.0	.0	7.5	7.0	7.0	14.5	13.0	14.0
21	.0	.0	.0	---	---	---	7.0	6.5	7.0	15.5	14.0	14.5
22	.0	.0	.0	---	---	---	7.0	6.5	6.5	16.5	14.5	15.5
23	.0	.0	.0	---	---	---	7.0	6.0	6.5	17.5	15.5	16.5
24	.0	.0	.0	---	---	---	6.0	5.5	6.0	18.0	17.0	17.5
25	.0	.0	.0	---	---	---	6.0	5.0	5.5	18.5	17.5	18.0
26	.0	.0	.0	---	---	---	6.5	6.0	6.0	18.0	18.0	18.0
27	.0	.0	.0	---	---	---	7.0	6.5	6.5	18.0	17.5	18.0
28	.0	.0	.0	---	---	---	7.0	7.0	7.0	18.5	17.0	18.0
29	---	---	---	---	---	---	8.0	7.0	7.5	19.0	18.0	18.5
30	---	---	---	---	---	---	8.5	7.5	8.0	19.0	18.0	18.5
31	---	---	---	---	---	---	---	---	---	19.0	17.5	18.0
MONTH	.0	.0	.0							19.0	8.0	13.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.0	17.0	17.5	20.5	19.5	20.0	22.0	21.5	21.5	21.5	21.0	21.5
2	18.0	16.5	17.5	20.5	20.0	20.0	22.5	21.5	22.0	21.5	20.5	21.0
3	18.5	17.0	17.5	21.5	20.5	21.0	22.0	21.5	22.0	20.5	20.0	20.0
4	19.0	17.5	18.0	22.0	21.0	21.5	22.0	21.5	22.0	20.5	19.5	20.0
5	19.0	18.5	18.5	23.0	21.5	22.0	22.0	21.5	21.5	20.0	19.5	20.0
6	18.5	18.0	18.5	23.5	22.5	23.0	21.0	20.0	20.5	20.0	19.0	19.5
7	18.5	17.5	18.0	24.0	23.0	23.5	20.5	20.0	20.0	19.5	19.0	19.0
8	19.0	18.0	18.5	25.0	23.5	24.5	21.0	20.5	20.5	19.0	18.0	18.5
9	19.5	18.5	19.0	25.5	24.5	25.0	21.0	20.5	21.0	18.5	17.5	18.0
10	19.0	18.0	18.5	25.5	24.5	25.0	20.5	20.0	20.5	18.0	17.0	17.5
11	19.0	18.0	18.5	26.0	24.5	25.0	20.5	20.0	20.0	18.0	17.5	17.5
12	20.5	18.5	19.5	25.5	25.0	25.0	20.0	19.5	20.0	18.5	17.5	18.0
13	20.0	19.5	19.5	26.0	25.0	25.5	20.5	20.0	20.5	18.0	17.5	17.5
14	20.5	20.0	20.0	25.5	24.5	25.0	20.5	20.0	20.0	18.5	17.5	17.5
15	21.0	20.0	20.5	25.0	24.5	24.5	20.5	20.0	20.0	18.0	17.0	17.5
16	21.0	20.5	20.5	24.5	24.0	24.5	20.5	19.5	20.0	17.0	16.5	17.0
17	20.5	20.0	20.5	24.0	23.5	24.0	20.5	19.5	20.0	16.5	16.0	16.5
18	20.5	19.5	20.0	24.0	23.5	23.5	20.5	19.5	20.0	16.0	15.5	16.0
19	19.5	19.0	19.0	24.0	23.5	23.5	20.5	19.5	20.0	16.5	15.0	15.5
20	19.0	18.0	18.5	23.5	23.0	23.5	20.5	19.5	20.0	16.0	15.0	15.5
21	18.5	18.0	18.0	23.0	22.5	23.0	21.0	20.0	20.5	15.0	14.0	14.5
22	18.0	17.5	18.0	22.5	22.0	22.0	21.5	20.0	20.5	14.0	13.0	13.5
23	18.0	17.5	17.5	22.5	21.5	22.0	21.0	20.5	20.5	13.5	12.5	13.0
24	18.0	17.0	17.5	23.0	21.5	22.0	21.0	20.5	21.0	12.5	12.5	12.5
25	18.0	17.0	17.5	23.0	22.0	22.5	21.5	20.5	21.0	12.5	11.5	12.5
26	18.5	17.0	18.0	22.5	21.5	22.0	21.0	20.5	20.5	12.5	11.5	12.5
27	19.0	17.5	18.0	22.0	21.0	21.5	21.5	20.5	21.0	12.5	11.5	12.0
28	19.0	18.5	19.0	21.5	21.0	21.0	21.5	21.0	21.5	11.5	10.5	11.5
29	19.5	18.5	19.0	22.0	20.0	21.0	21.5	21.0	21.5	11.5	10.0	11.0
30	20.5	19.0	19.5	22.0	20.5	21.5	22.0	21.5	21.5	10.5	9.5	10.0
31	---	---	---	22.0	21.0	21.5	22.0	21.5	21.5	---	---	---
MONTH	21.0	16.5	18.5	26.0	19.5	23.0	22.5	19.5	20.5	21.5	9.5	16.0

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI
(National stream-quality accounting network and radiochemical station)

LOCATION (REVISED).--Lat 46°29'29", long 84°25'17", in NW¼ sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 2.6 mi (4.2 km) west of the International Bridge, at Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi² (210,000 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1974 to September 1981.
WATER TEMPERATURES: March 1974 to September 1981.

REMARKS.--Daily observer samples and monthly samples were collected at the raw-water tap in Sault Ste. Marie municipal water plant at Big Point. Intake is 1,500 ft (457 m) out at a depth of 30 ft (9 m), 10 ft (3 m) above bottom of channel.

COOPERATION.--Once daily temperature and specific conductance records were collected by Sault Ste. Marie municipal treatment facility employees. Discharge records furnished by U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 113 micromhos Oct. 26, 1980; minimum daily, 76 micromhos Apr. 24, 1975.
WATER TEMPERATURES: Maximum daily, 24.0°C July 25, 1979; minimum daily, 0.0°C Mar. 14, 15, 1974, Feb. 1, 1979.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 113 micromhos Oct. 26; minimum daily, 86 micromhos Apr. 8.
WATER TEMPERATURES: Maximum daily, 20.5°C Aug. 7, 13-15; minimum daily, 2.0°C Apr. 6, 7.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
OCT											
09...	0910	82300	93	7.2	13.0	12.1	99	K1	14	44	0
NOV											
07...	0850	82900	94	7.6	8.5	12.6	97	<2	<2	41	2
DEC											
10...	0900	67400	92	7.6	5.0	--	--	<1	<1	41	0
JAN											
07...	0915	66700	93	7.4	3.0	14.0	98	<1	<1	42	7
FEB											
11...	1000	67400	99	7.5	2.5	13.6	96	<1	<1	44	0
MAR											
04...	0900	66900	98	7.4	3.0	--	--	K1	K5	41	0
APR											
08...	0900	75300	91	7.1	3.0	11.5	93	<1	K4	44	3
MAY											
06...	0915	87900	94	7.7	5.5	12.0	102	K2	<1	43	0
JUN											
10...	0845	95900	95	7.3	10.0	11.1	110	K1	<1	47	4
JUL											
09...	0850	103000	92	7.3	17.5	8.7	99	K2	K3	43	3
AUG											
12...	0930	97200	94	8.1	20.0	8.4	91	K4	16	44	0
SEP											
09...	0905	81100	92	7.2	18.0	10.2	99	K1	K3	41	0

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT											
09...	13	2.7	1.2	6	.1	.5	.40	58	0	48	5.9
NOV											
07...	12	2.7	1.2	6	.1	.6	--	57	0	47	1.9
DEC											
10...	12	2.7	1.2	6	.1	.4	--	56	0	46	2.3
JAN											
07...	13	2.4	.8	4	.1	.5	.40	54	0	44	3.4
FEB											
11...	13	2.8	1.5	7	.1	.5	.40	56	0	46	2.8
MAR											
04...	12	2.7	1.4	7	.1	.6	.40	54	0	44	2.8
APR											
08...	13	2.7	1.1	5	.1	.5	.40	50	0	41	6.4
MAY											
06...	13	2.6	1.3	6	.1	.6	.40	54	0	44	1.7
JUN											
10...	14	2.8	1.3	6	.1	.5	.40	53	0	43	4.3
JUL											
09...	13	2.6	1.5	7	.1	.5	.40	49	0	40	4.3
AUG											
12...	13	2.9	1.9	8	.1	.5	.40	55	0	45	.6
SEP											
09...	12	2.6	1.3	6	.1	.4	--	53	0	43	5.2

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)
OCT										
09...	3.3	1.4	.1	2.4	45	54	10000	.26	.26	.040
NOV										
07...	2.7	1.1	.0	2.1	54	47	12100	.30	.30	.010
DEC										
10...	2.9	1.2	.0	2.2	56	52	10200	.31	.31	.000
JAN										
07...	3.2	1.3	.0	1.9	54	46	9730	.31	.30	.010
FEB										
11...	1.9	1.1	<.1	2.8	60	53	10900	.32	.32	.020
MAR										
04...	1.7	1.2	<.1	2.2	65	45	11700	.32	.32	.040
APR										
08...	3.5	1.4	<.1	2.3	60	51	12200	.29	.29	.040
MAY										
06...	3.3	1.2	<.1	2.5	50	52	11900	.28	.28	.040
JUN										
10...	2.8	1.3	<.1	2.3	56	52	14500	.28	.26	.020
JUL										
09...	1.4	1.1	<.1	2.3	48	50	13300	.25	.25	.010
AUG										
12...	2.4	1.0	<.1	2.3	53	49	13900	.27	.27	.030
SEP										
09...	2.7	1.2	<.1	2.5	53	49	11600	.24	.24	.020

DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
OCT										
09...	.020	.03	.12	.16	.42	1.9	.010	.03	.000	--
NOV										
07...	.010	.01	.14	.15	.45	2.0	.000	.00	.000	2.3
DEC										
10...	.000	.00	.04	.04	.35	1.6	.000	.00	.000	1.7
JAN										
07...	.010	.01	.12	.13	.44	1.9	.010	.03	.010	--
FEB										
11...	.010	.01	.14	.16	.48	2.1	.010	.03	.010	2.9
MAR										
04...	.040	.05	.12	.16	.48	2.1	--	.03	.010	4.0
APR										
08...	.040	.05	.06	.10	.39	1.7	<.010	.03	<.010	--
MAY										
06...	.020	.03	.19	.23	.51	2.3	<.010	.03	<.010	1.6
JUN										
10...	.020	.03	.18	.20	.48	2.1	<.010	.03	<.010	2.5
JUL										
09...	.010	.01	.24	.25	.50	2.2	<.010	.03	<.010	--
AUG										
12...	.030	.04	1.6	1.60	1.9	8.3	<.010	.03	<.010	2.1
SEP										
09...	<.010	.01	.12	.14	.38	1.7	<.010	--	<.010	3.7

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT											
09...	0910	1	1	100	20	--	2	20	<10	0	0
JAN											
07...	0915	1	0	100	10	0	0	10	10	0	0
APR											
08...	0900	0	0	100	10	0	<1	<10	<10	1	0
JUL											
09...	0850	4	1	<50	10	1	<1	--	10	1	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT										
09...	--	3	50	0	0	0	10	0	.3	.3
JAN										
07...	5	5	40	0	4	0	<10	0	.2	<.1
APR										
08...	5	2	470	30	5	0	30	2	.4	.3
JUL										
09...	3	2	50	<10	8	1	--	1	.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT										
09...	2	0	0	0	0	0	--	50	1.4	.2
JAN										
07...	5	5	0	0	1	0	60	30	1.2	.2
APR										
08...	1	0	0	0	0	0	60	30	4.4	.2
JUL										
09...	--	3	0	0	0	0	60	30	1.5	.2

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DIS-SOLVED (PCI/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (PCI/L AS U-NAT)	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM DIS-SOLVED, EXTRAC-TION (UG/L)
OCT											
09...	0910	<.7	<.3	<1.1	<.4	1.7	<.4	1.7	<.4	.07	.14
MAY											
06...	0915	.7	.3	<1.0	<.4	1.6	<.4	1.6	<.4	.03	.05

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

		NOV 8,80	MAR 4,81	MAY 6,81	JUN 10,81
DATE		NOV 8,80	MAR 4,81	MAY 6,81	JUN 10,81
TIME		0850	0900	0915	0845
TOTAL CELLS/ML		26	130	90	170
DIVERSITY:	DIVISION	0.0	1.4	0.0	0.9
	.CLASS	0.0	1.4	0.0	0.9
	..ORDER	0.0	1.6	0.0	1.1
	...FAMILY	1.0	1.6	0.0	1.1
	....GENUS	1.0	1.6	0.0	1.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	26*	20	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	13	10	--	-	39*	23
..PENNALES								
...ACHNANTHACEAE								
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	13*	50	13	10	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	13	8
...NITZSCHIACEAE								
....NITZSCHIA	13*	50	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	77*	60	90*	100	120*	69
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 9,81	AUG 12,81	SEP 9,81
TIME	0850	0930	0905
TOTAL CELLS/ML	220	360	1200
DIVERSITY: DIVISION	0.3	0.9	1.3
.CLASS	0.3	0.9	1.3
..ORDER	1.0	1.1	1.6
...FAMILY	1.7	1.6	2.1
....GENUS	1.7	1.6	2.1

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	--	-	--	-	14	1
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	220#	62	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	28	8	--	-
....OOCYSTIS	--	-	--	-	56	5
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	--	-	170	14
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	--	-	56	5
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	13	6	--	-	28	2
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	39#	18	84#	23	56	5
..PENNALES						
...ACHNANTHACEAE						
....COCCONEIS	--	-	14	4	--	-
...CYMBELLACEAE						
....CYMBELLA	--	-	--	-	42	4
...FRAGILARIACEAE						
....ASTERIONELLA	51#	24	14	4	28	2
....SYNEDRA	--	-	--	-	28	2
...NITZSCHIACEAE						
....NITZSCHIA	--	-	--	-	--	-
...TABELLARIACEAE						
....TABELLARIA	120#	53	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	700#	60

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	95	90	95	94	95	98	94	95	95	96	95
2	95	105	90	94	94	96	93	95	95	95	96	95
3	96	93	92	93	94	95	94	95	95	94	96	95
4	94	93	92	93	94	95	94	90	93	94	95	95
5	94	93	93	96	96	95	96	90	93	94	95	96
6	95	93	93	96	94	93	96	90	94	95	96	95
7	96	98	92	93	96	95	95	92	93	94	95	95
8	93	95	90	96	94	95	86	91	95	94	95	---
9	93	96	90	95	94	96	89	92	95	95	96	95
10	94	99	90	95	93	96	88	93	95	95	95	97
11	92	98	92	96	94	95	89	92	94	94	95	97
12	92	98	94	95	94	95	88	93	95	93	96	97
13	93	95	92	94	94	94	91	93	95	93	96	96
14	95	98	93	94	94	94	95	94	95	95	96	96
15	95	99	93	95	94	94	95	94	95	96	95	96
16	95	98	95	94	94	95	93	93	94	96	95	96
17	94	99	93	94	94	95	95	94	94	96	94	96
18	95	98	92	94	94	95	95	94	94	95	94	96
19	93	96	92	94	94	95	94	94	94	96	96	96
20	94	95	92	94	94	96	95	94	94	96	96	96
21	92	93	93	94	94	94	94	94	94	96	96	95
22	92	96	94	94	94	95	95	95	95	95	96	96
23	93	97	94	95	94	94	95	94	95	96	95	95
24	92	92	94	95	95	95	94	94	95	96	95	95
25	91	91	94	94	93	95	94	94	94	96	91	96
26	113	92	95	94	94	94	94	95	95	96	97	96
27	92	91	94	93	96	94	94	95	94	96	96	96
28	92	91	95	94	93	94	95	96	94	95	96	95
29	96	91	95	95	---	95	95	96	95	95	96	95
30	93	90	94	94	---	93	95	94	95	96	94	95
31	93	---	---	96	---	93	---	94	---	96	95	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.5	---	6.0	3.5	3.0	4.0	2.5	4.5	9.0	13.5	19.5	15.0
2	13.5	8.0	6.0	3.0	3.0	3.5	2.5	4.5	8.5	14.5	19.5	15.0
3	13.0	---	4.5	3.0	3.0	3.5	2.5	5.5	8.5	15.0	19.5	14.0
4	12.5	8.5	4.5	3.0	3.0	3.5	3.0	5.5	8.5	14.5	20.0	16.5
5	12.5	8.5	4.5	3.0	3.0	3.5	2.5	6.0	8.5	14.5	20.0	17.5
6	12.5	8.0	5.0	3.0	3.0	3.5	2.0	5.5	9.0	14.0	20.0	17.5
7	12.5	8.5	5.5	3.0	3.0	3.5	2.0	6.0	9.0	15.0	20.5	18.5
8	13.0	8.0	6.0	2.5	3.0	3.5	2.5	6.5	9.0	15.5	19.5	---
9	13.0	8.0	5.5	3.0	3.0	3.5	2.5	6.5	9.5	17.5	19.0	18.0
10	13.0	7.5	5.0	3.0	3.0	3.5	3.0	6.0	10.0	17.5	20.0	18.0
11	12.5	6.5	4.0	3.0	3.0	3.5	3.0	6.0	9.5	18.0	20.0	18.0
12	12.0	6.5	4.0	3.0	3.0	3.5	3.5	5.5	10.0	19.0	20.0	18.0
13	11.5	6.0	2.5	3.0	3.0	3.0	3.5	6.0	10.0	19.0	20.5	18.0
14	11.0	7.5	3.0	3.0	3.0	3.0	3.5	6.0	10.5	18.5	20.5	18.0
15	11.0	7.0	3.0	3.0	3.0	3.0	2.5	6.0	10.5	19.0	20.5	17.5
16	11.5	7.0	2.5	3.0	3.0	3.0	3.5	6.5	10.0	19.5	19.0	17.5
17	12.0	7.0	3.0	3.0	3.0	3.0	4.0	6.5	10.0	20.0	19.0	18.0
18	12.0	7.0	3.5	3.0	3.0	3.0	3.5	7.0	10.0	20.0	19.0	17.0
19	11.5	6.5	3.0	3.0	3.0	3.0	4.0	7.0	10.5	20.0	19.5	17.0
20	11.0	6.5	3.0	3.0	3.0	3.0	3.5	7.0	10.5	20.0	19.5	16.0
21	11.0	7.0	3.5	3.0	3.0	3.0	3.5	7.0	10.5	19.0	19.5	15.0
22	10.5	7.0	3.0	3.0	3.0	3.0	3.5	7.0	10.5	19.0	19.5	15.0
23	10.0	7.0	3.0	3.0	3.0	3.5	4.0	7.5	10.5	19.5	20.0	15.5
24	10.0	7.0	3.0	3.0	3.0	2.5	3.5	8.0	11.0	20.0	19.0	15.5
25	10.5	6.5	3.0	3.0	3.5	2.5	4.0	8.0	11.5	19.0	19.5	15.5
26	10.0	6.5	3.0	3.0	3.5	2.5	4.0	8.0	11.5	18.5	19.5	15.5
27	9.5	6.5	3.0	3.0	4.0	2.5	4.0	7.5	11.5	18.0	19.0	15.5
28	8.5	6.5	3.0	3.0	4.0	2.5	4.0	7.5	12.5	18.5	19.0	14.5
29	8.5	6.5	3.0	3.0	---	2.5	4.0	8.0	13.0	18.5	18.0	13.5
30	8.5	6.0	3.0	3.0	---	3.0	4.5	8.0	13.5	19.0	16.5	14.0
31	8.5	---	3.0	3.0	---	2.5	---	8.5	---	19.5	16.0	---

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE¼ sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi (1.6 km) downstream from West Branch, 6.0 mi (9.7 km) northeast of Manistique, and at mile 19.5 (31.4 km).

DRAINAGE AREA.--1,100 mi² (2,849 km²), approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft (185.3 m) from river-profile map (nearest ft). Prior to July 15, 1939, nonrecording gage at site 1,600 ft (487.7 m) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, 1,440 ft³/s (40.78 m³/s), 17.78 in/yr (452 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft³/s (479 m³/s) May 11, 1960, gage height, 12.85 ft (3.917 m); minimum, 288 ft³/s (8.16 m³/s) Oct. 4, 1948; minimum gage height, 1.01 ft (0.308 m) Aug. 23, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,720 ft³/s (219 m³/s) Apr. 6, gage height, 10.99 ft (3.350 m); minimum, 493 ft³/s (14.0 m³/s) Sept. 24, 25, 26, gage height, 2.51 ft (0.765 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1060	1420	1320	730	750	1800	3350	2890	987	1530	562	532
2	1020	1350	1290	740	750	1800	3900	2640	974	1530	572	545
3	976	1300	1200	740	750	1800	4480	2440	975	1440	610	555
4	940	1260	1050	730	750	1800	5350	2380	1020	1310	731	558
5	906	1220	1000	720	760	1750	6670	2530	1080	1250	802	555
6	876	1180	1000	720	760	1700	7620	2750	1150	1210	801	535
7	850	1160	1000	720	760	1650	7530	2880	1180	1130	803	522
8	845	1120	1000	720	750	1600	7250	2900	1170	1050	799	541
9	827	1120	960	720	750	1550	6950	2850	1170	982	762	553
10	798	1160	850	720	750	1500	6700	2690	1230	917	746	568
11	786	1180	800	720	750	1470	6400	2480	1270	867	773	584
12	773	1190	760	720	750	1440	6030	2270	1280	836	790	591
13	773	1230	760	720	740	1400	5710	2090	1280	805	763	589
14	795	1430	760	710	740	1370	5530	1930	1360	774	719	584
15	814	1670	760	700	740	1330	5370	1780	1700	740	691	565
16	826	1760	760	700	740	1300	5240	1660	2000	716	663	550
17	834	1790	760	700	760	1280	5110	1550	2160	694	635	531
18	920	1780	740	700	800	1260	4910	1450	2280	688	616	526
19	1050	1680	720	700	900	1240	4610	1370	2250	694	590	528
20	1150	1590	720	700	1000	1200	4270	1300	2080	703	573	522
21	1160	1510	720	700	1100	1180	3970	1240	1870	699	556	511
22	1180	1460	720	710	1200	1200	3640	1180	1670	676	548	504
23	1190	1450	720	710	1350	1250	3380	1140	1530	659	536	499
24	1200	1470	720	720	1500	1350	3360	1100	1420	643	529	495
25	1260	1510	720	730	1650	1420	3490	1060	1340	636	520	494
26	1390	1550	720	740	1700	1520	3540	1050	1260	639	519	497
27	1510	1530	710	740	1750	1650	3520	1030	1180	632	515	503
28	1580	1470	700	750	1800	1780	3400	1000	1110	618	513	507
29	1590	1400	700	750	---	1990	3240	984	1210	602	518	503
30	1560	1350	700	750	---	2370	3090	984	1380	589	522	506
31	1500	---	720	750	---	2860	---	979	---	576	522	---
TOTAL	32939	42290	26060	22380	27500	48810	147610	56577	42566	26835	19799	16053
MEAN	1063	1410	841	722	982	1575	4920	1825	1419	866	639	535
MAX	1590	1790	1320	750	1800	2860	7620	2900	2280	1530	803	591
MIN	773	1120	700	700	740	1180	3090	979	974	576	513	494
CFSM	.97	1.28	.77	.66	.89	1.43	4.47	1.66	1.29	.79	.58	.49
IN.	1.11	1.43	.88	.76	.93	1.65	4.99	1.91	1.44	.91	.67	.54

CAL YR 1980 TOTAL 463158 MEAN 1265 MAX 7850 MIN 478 CFSM 1.15 IN 15.66
WTR YR 1981 TOTAL 509419 MEAN 1306 MAX 7620 MIN 494 CFSM 1.27 IN 17.23

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE¼ SE¼ sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi (1.1 km) downstream from Indian River, 0.8 mi (1.3 km) upstream from U.S. Highway 2, and 1.8 mi (2.9 km) upstream from mouth.

DRAINAGE AREA.--1,445 mi^2 (3,743 km^2), approximately.

PERIOD OF RECORD.--Water years 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to September 1981.
WATER TEMPERATURES: October 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--In addition to the water-quality monitor, samples are collected periodically by a local observer. Monthly samples are collected as a cross-section sample at the Wyman State Nursery site or at railroad bridge 1,200 ft (366 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument. Occasional regulation by dam 0.4 mi (0.6 km) downstream. Intermittent ice cover during the winter period. Prior to Oct. 1, 1975, water quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi (2.4 km) downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum (water years 1976, 1979-81), 57 micromhos Apr. 25, 1979.
WATER TEMPERATURES: Maximum (water years 1976-80), 26.5°C July 15, 23, 1979; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 231 micromhos Feb. 19; minimum, 68 micromhos Apr. 7.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 20...	1230	1000	166	7.6	7.0	11.7	99	<3	K9	83	25	25
NOV 19...	1120	3000	134	7.8	.5	13.4	94	K6	K9	71	27	21
DEC 17...	1045	E1500	215	7.6	.0	13.7	96	<2	K6	98	16	29
JAN 19...	1030	E1400	198	7.2	.0	11.0	77	K3	<4	97	31	29
FEB 18...	1115	1300	222	7.5	.0	--	--	K3	--	94	23	27
MAR 19...	1145	1250	189	7.5	.5	12.3	88	K1	K4	83	14	24
APR 16...	1215	6200	82	7.2	7.0	11.2	94	K2	K2	42	11	12
MAY 19...	1100	1900	144	7.7	13.0	9.6	92	K3	K2	68	9	20
JUN 18...	1045	3000	150	7.5	17.5	8.0	85	23	33	74	14	22
JUL 20...	1130	800	198	7.9	23.5	7.2	86	K20	K19	110	30	31
AUG 18...	1100	415	181	8.0	22.5	8.2	96	K21	K20	97	22	29
SEP 16...	1140	900	194	7.8	16.0	8.8	90	K8	K8	95	17	27

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT 20...	5.1	1.1	3	.1	.6	--	83	0	68	2.8	19
NOV 19...	4.6	1.2	4	.1	.6	--	71	0	58	1.4	22
DEC 17...	6.1	1.5	3	.1	.6	.40	100	0	82	4.0	29
JAN 19...	6.0	1.3	3	.1	.6	--	95	0	78	8.1	24
FEB 18...	6.4	1.6	4	.1	.6	.40	96	0	79	4.4	25
MAR 19...	5.5	1.5	4	.1	.6	.40	84	0	69	4.3	18
APR 16...	2.9	1.5	7	.1	.5	.40	38	0	31	3.8	9.3
MAY 19...	4.3	1.2	4	.1	.6	.40	72	0	59	1.9	17
JUN 18...	4.6	1.2	3	.1	.5	.40	73	0	60	3.2	16
JUL 20...	6.8	1.7	3	.1	.6	.40	98	0	80	1.9	22
AUG 18...	5.9	1.4	3	.1	.6	.40	92	0	75	1.3	25
SEP 16...	6.8	1.5	3	.1	.7	--	95	0	78	2.1	25

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT											
20...	1.4	.1	6.2	115	94	311	.06	.05	.040	.030	.04
NOV											
19...	1.8	.1	5.8	103	84	834	.86	.13	.050	.010	.01
DEC											
17...	1.7	.1	6.7	147	125	E595	.19	.19	.050	.020	.03
JAN											
19...	1.7	<.1	7.6	130	111	E491	.14	.12	.080	.060	.08
FEB											
18...	1.6	<.1	8.2	139	114	488	.13	.13	.060	.060	.08
MAR											
19...	1.4	<.1	8.5	119	97	402	.14	.14	.050	.050	.06
APR											
16...	1.1	<.1	4.3	69	51	1160	.09	.09	.060	.040	.05
MAY											
19...	1.3	<.1	4.0	102	79	523	.05	.04	.040	.030	.04
JUN											
18...	1.6	<.1	4.5	104	82	842	.05	.05	.030	.010	.01
JUL											
20...	1.4	<.1	7.2	134	119	289	.09	.07	.010	.010	.01
AUG											
18...	1.7	<.1	6.7	142	111	159	.06	.06	.040	.020	.03
SEP											
16...	1.7	<.1	6.2	131	111	318	.07	.07	.020	.020	.03

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
20...	.25	.29	.35	1.6	.010	.03	.010	--	3	8.1	100
NOV											
19...	.43	.48	1.3	5.9	--	.03	.020	12	6	49	100
DEC											
17...	.23	.28	--	--	.010	.03	.000	6.6	--	--	--
JAN											
19...	.27	.35	.49	2.2	<.010	<.03	<.010	--	2	E7.6	100
FEB											
18...	.22	.28	.41	1.8	<.010	.03	<.010	6.1	4	14	100
MAR											
19...	.19	.24	.38	1.7	.030	.09	.020	8.2	2	6.7	100
APR											
16...	.62	.68	.77	3.4	.020	.06	<.010	--	7	117	100
MAY											
19...	.42	.46	.51	2.3	.020	.06	<.010	9.1	6	31	100
JUN											
18...	.44	.47	.52	2.3	.020	.06	<.010	12	5	40	100
JUL											
20...	.94	.95	1.0	4.6	--	.03	.030	--	5	11	100
AUG											
18...	.38	.42	.48	2.1	.010	.03	<.010	7.7	4	4.5	100
SEP											
16...	.40	.42	.49	2.2	.020	.06	<.010	6.7	4	9.7	100

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 20...	1230	1	1	100	20	0	0	10	0	0	0
JAN 19...	1030	1	1	100	20	0	<1	10	<10	1	0
APR 16...	1215	3	1	100	30	--	2	10	10	1	0
JUL 20...	1130	4	1	100	20	--	2	10	10	4	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 20...	1	1	480	470	1	0	30	10	.2	.2
JAN 19...	0	0	690	350	2	0	20	20	.2	<.1
APR 16...	5	3	--	300	9	0	10	10	.3	.3
JUL 20...	6	2	1500	790	15	1	60	30	<.2	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 20...	1	0	0	0	0	0	10	0	16	.6
JAN 19...	--	4	0	0	0	0	20	0	5.4	.4
APR 16...	2	1	0	0	0	0	70	70	15	.4
JUL 20...	14	1	0	0	0	0	40	<4	--	.6

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 19,80	MAR 19,81	MAY 19,81	JUN 18,81
TIME	1120	1145	1100	1045
TOTAL CELLS/ML	5400	460	1400	18000
DIVERSITY: DIVISION	1.2	0.3	1.0	0.3
.CLASS	1.2	0.3	1.0	0.3
..ORDER	1.9	0.4	1.3	0.6
...FAMILY	2.1	0.4	1.5	0.6
....GENUS	2.2	0.4	2.0	0.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....TETRAEDRON	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	52	1	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	--	-	--	-	*	0
....CHODATELLA	39	1	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	*	0
....KIRCHNERIELLA	--	-	--	-	--	-	*	0
....OOCYSTIS	300	5	--	-	--	-	96	1
....QUADRIGULA	--	-	--	-	--	-	--	-
....SELENASTRUM	*	0	--	-	--	-	--	-
...SCENEDFSMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	*	0
....SCENEDESMUS	100	2	--	-	--	-	110	1
....TETRASTRUM	52	1	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	--	-	*	0
....COSMARIUM	--	-	--	-	--	-	*	0
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	790	15	13	3	--	-	96	1
....MELOSIRA	--	-	--	-	26	2	--	-
....STEPHANODISCUS	--	-	--	-	51	4	*	0
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	*	0
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	*	0
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....OPEPHORA	--	-	--	-	--	-	*	0
...FRAGILARIACEAE								
....ASTERIONELLA	150	3	--	-	--	-	--	-
....FRAGILARIA	39	1	--	-	210	15	--	-
....SYNEDRA	*	0	--	-	490*	35	*	0
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	*	0
...NAVICULACEAE								
....NAVICULA	*	0	--	-	26	2	*	0
...NITZSCHIACEAE								
....NITZSCHIA	*	0	13	3	13	1	110	1
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	*	0

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 19,80		MAR 19,81		MAY 19,81		JUN 18,81	
TIME	1120		1145		1100		1045	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	2600#	48	--	-	13	1	16000#	91
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	440#	94	580#	41	--	-
....OSCILLATORIA	1200#	22	--	-	--	-	810	5
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 20,81	AUG 18,81	SEP 16,81
TIME	1130	1100	1140
TOTAL CELLS/ML	7600	5000	9300
DIVERSITY: DIVISION	0.7	0.7	1.2
.CLASS	0.7	0.7	1.3
..ORDER	1.0	0.7	1.7
...FAMILY	1.0	0.8	1.9
....GENUS	1.1	1.3	2.5

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....TETRAEDRON	--	-	27	1	--	-
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	--	-	--	-	52	1
...MICRACTINIACEAE						
....MICRACTINIUM	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	*	0	--	-	52	1
....CHODATELLA	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	70	1
....OOCYSTIS	*	0	--	-	--	-
....QUADRIGULA	--	-	--	-	70	1
....SELENASTRUM	*	0	--	-	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	770	10	--	-	910	10
....SCENEDESMUS	130	2	200	4	240	3
....TETRASTRUM	--	-	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	39	1	--	-	*	0
..ZYGNEMATALES						
...DESMIDIACEAE						
....CLOSTERIUM	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	*	0
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	64	1	54	1	1000	11
....MELOSIRA	--	-	*	0	52	1
....STEPHANODISCUS	--	-	--	-	*	0
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	*	0
...DIATOMACEAE						
....OPEPHORA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	--	-	27	1	--	-
....SYNEDRA	*	0	110	2	*	0
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	--	-	--	-
...NAVICULACEAE						
....NAVICULA	--	-	--	-	--	-
...NITZSCHIACEAE						
....NITZSCHIA	51	1	120	2	87	1
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...OCHROMONADACEAE						
....OCHROMONAS	--	-	--	-	120	1
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	--	-	--	-

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 20,81		AUG 18,81		SEP 16,81	
TIME	1130		1100		1140	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	490	10	--	-
....ANACYSTIS	6100#	81	--	-	1300	14
....GOMPHOSPHAERIA	--	-	4000#	79	4500#	49
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	630	7
....OSCILLATORIA	330	4	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	27	1	*	0
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GLENODINIACEAE						
....GLENODINIUM	*	0	--	-	--	-
...PERIDINIACEAE						
....PERIDINIUM	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	184	171	176	168	158	163	177	172	174	193	188	190
2	184	174	180	164	158	161	178	169	174	190	187	188
3	178	175	176	172	165	169	185	172	179	197	186	190
4	193	175	178	177	171	173	199	182	185	193	188	190
5	191	177	181	175	169	173	195	187	190	194	188	190
6	196	181	188	177	168	171	191	185	188	193	188	190
7	197	180	188	182	178	179	187	184	185	192	186	189
8	196	186	189	186	179	181	185	181	184	194	187	192
9	194	182	187	195	187	190	185	179	182	195	192	193
10	189	183	186	196	184	191	186	179	181	196	191	194
11	193	182	187	186	184	185	183	174	179	198	193	196
12	191	176	185	188	186	187	200	182	192	199	192	195
13	183	173	178	191	187	188	196	190	193	197	193	195
14	182	173	179	189	185	187	200	193	196	196	192	194
15	187	179	182	186	177	181	202	192	198	194	190	192
16	192	185	188	177	172	175	199	190	195	194	189	191
17	187	183	185	172	166	169	199	189	195	195	189	192
18	185	180	183	168	163	166	196	189	193	195	191	192
19	184	176	179	168	164	165	195	187	190	192	188	189
20	175	170	172	170	165	167	199	191	195	193	188	191
21	173	165	169	174	167	171	200	193	197	194	190	191
22	172	164	169	171	157	166	197	191	194	195	192	193
23	173	167	170	179	171	175	198	191	194	196	193	194
24	176	173	174	178	174	176	195	187	191	197	194	195
25	180	175	177	175	168	173	196	193	195	198	193	195
26	175	158	169	173	166	171	198	191	194	198	192	195
27	172	154	162	173	166	169	194	189	191	199	195	197
28	172	167	170	169	165	167	194	192	192	201	197	199
29	167	149	158	170	165	167	193	188	190	202	196	199
30	156	149	154	174	163	168	194	187	190	201	197	198
31	166	157	162	---	---	---	191	186	189	204	198	200
MONTH	197	149	177	196	157	174	202	169	189	204	186	193

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	207	200	203	193	190	191	146	127	137	134	125	129
2	209	204	207	194	190	192	130	118	123	132	126	128
3	211	205	208	192	189	191	123	113	116	130	125	128
4	213	209	211	193	191	192	125	112	119	135	128	131
5	216	209	213	195	191	192	129	113	123	136	132	134
6	218	214	216	194	190	193	113	79	95	142	130	134
7	218	215	216	196	192	193	79	68	74	136	122	127
8	223	217	220	194	192	193	96	71	85	136	119	124
9	225	221	223	193	190	191	92	77	85	125	118	121
10	225	222	223	192	188	190	88	75	81	126	117	122
11	224	220	222	191	187	189	104	84	97	132	123	127
12	226	222	225	191	187	189	95	81	87	140	126	133
13	228	225	226	191	188	190	97	79	84	138	132	135
14	228	223	225	190	187	189	103	77	94	147	131	137
15	228	222	225	192	187	190	91	75	81	153	138	144
16	228	224	226	196	188	191	98	89	92	151	135	141
17	229	224	227	193	188	191	102	87	94	140	132	136
18	229	226	228	194	190	192	105	91	99	146	137	141
19	231	225	227	195	192	193	100	88	95	148	143	145
20	228	223	225	195	192	193	110	96	104	161	148	155
21	223	218	221	192	190	191	110	101	106	164	154	159
22	217	212	214	194	187	191	117	105	110	167	160	163
23	211	208	210	190	185	188	121	114	116	171	163	167
24	207	202	205	186	181	184	128	117	122	168	165	167
25	204	200	202	181	177	180	128	119	123	169	165	167
26	199	194	196	186	179	183	118	113	115	172	167	169
27	195	191	193	185	175	181	126	115	119	173	169	171
28	195	192	193	176	168	171	123	115	120	176	172	174
29	---	---	---	170	161	166	135	117	122	179	173	176
30	---	---	---	161	152	158	133	124	130	177	174	175
31	---	---	---	152	136	146	---	---	---	183	175	178
MONTH	231	191	215	196	136	186	146	68	105	183	117	146

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	183	174	178	164	160	161	193	186	188	195	190	192
2	181	175	178	163	156	160	203	183	190	196	192	193
3	179	177	178	162	155	159	200	183	193	196	192	194
4	178	175	176	167	158	162	189	184	186	198	194	196
5	180	174	176	170	163	166	185	180	182	197	194	196
6	179	174	176	189	170	174	181	176	180	199	191	196
7	176	165	172	---	---	---	177	174	175	198	197	198
8	170	164	166	---	---	---	178	175	177	199	192	197
9	170	166	168	---	---	---	179	173	175	196	190	193
10	167	164	165	---	---	---	178	173	175	194	188	191
11	168	161	164	---	---	---	183	176	179	199	193	196
12	162	158	160	---	---	---	182	176	178	197	190	194
13	163	157	160	---	---	---	177	174	176	198	196	197
14	---	---	---	---	---	---	178	175	176	199	194	198
15	---	---	---	---	---	---	182	176	177	199	192	196
16	172	169	170	---	---	---	178	175	176	199	192	196
17	169	159	165	---	---	---	183	174	177	199	188	194
18	164	154	159	---	---	---	188	180	183	200	193	197
19	165	156	160	---	---	---	190	180	183	203	197	199
20	165	158	161	---	---	---	187	179	182	200	197	199
21	164	161	162	---	---	---	188	182	184	200	196	198
22	167	161	164	---	---	---	187	183	186	197	193	195
23	174	165	168	---	---	---	192	186	190	199	196	197
24	175	165	171	---	---	---	198	189	193	203	198	201
25	173	170	171	---	---	---	201	194	198	201	197	199
26	185	165	177	---	---	---	196	189	192	198	197	198
27	183	176	180	---	---	---	195	187	191	199	197	198
28	191	177	179	---	---	---	201	194	198	198	194	196
29	180	175	178	---	---	---	200	187	194	195	192	193
30	172	161	165	---	---	---	194	189	191	194	191	193
31	---	---	---	194	189	192	196	189	193	---	---	---
MONTH							203	173	184	203	188	196

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	12.5	11.5	12.0				---	---	---	.0	.0	.0
2	12.5	11.0	12.0				---	---	---	.0	.0	.0
3	11.0	10.0	10.5				---	---	---	.0	.0	.0
4	10.0	9.0	9.5				---	---	---	.0	.0	.0
5	9.0	8.0	8.5				---	---	---	.0	.0	.0
6	9.5	8.5	9.0				---	---	---	.0	.0	.0
7	10.0	9.0	9.5				---	---	---	.0	.0	.0
8	11.0	10.0	10.5				---	---	---	.0	.0	.0
9	10.5	9.5	10.0				---	---	---	.0	.0	.0
10	10.5	10.0	10.0				---	---	---	.0	.0	.0
11	10.5	9.0	10.0				.0	.0	.0	.0	.0	.0
12	9.0	8.5	9.0				.0	.0	.0	.0	.0	.0
13	8.5	7.5	8.0				.0	.0	.0	.0	.0	.0
14	8.0	7.0	7.5				.0	.0	.0	.0	.0	.0
15	8.0	7.0	7.5				.0	.0	.0	.0	.0	.0
16	7.5	7.0	7.0				.0	.0	.0	.0	.0	.0
17	9.0	7.0	8.0				.0	.0	.0	.0	.0	.0
18	9.0	8.5	9.0				.0	.0	.0	.0	.0	.0
19	8.5	7.5	8.0				.0	.0	.0	.0	.0	.0
20	7.5	7.0	7.0				.0	.0	.0	.0	.0	.0
21	7.0	6.5	6.5				.0	.0	.0	.0	.0	.0
22	6.5	5.5	6.0				.0	.0	.0	.0	.0	.0
23	6.5	5.0	5.5				.0	.0	.0	.0	.0	.0
24	7.0	6.0	6.5				.0	.0	.0	.0	.0	.0
25	7.0	6.5	7.0				.0	.0	.0	.0	.0	.0
26	---	---	---				.0	.0	.0	.0	.0	.0
27	---	---	---				.0	.0	.0	.0	.0	.0
28	---	---	---				.0	.0	.0	.0	.0	.0
29	---	---	---				.0	.0	.0	.0	.0	.0
30	---	---	---				.0	.0	.0	.0	.0	.0
31	---	---	---				.0	.0	.0	.0	.0	.0
MONTH										.0	.0	.0

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	---	.0	---	5.0	4.5	4.5	11.0	9.0	10.0
2	.0	.0	.0	---	.0	---	5.0	3.0	4.0	11.0	9.5	10.0
3	.0	.0	.0	---	.0	---	5.0	4.0	4.5	11.0	10.0	10.0
4	.0	.0	.0	---	.0	---	4.5	3.5	4.0	11.0	10.0	10.5
5	.0	.0	.0	---	.0	---	3.5	---	---	11.0	10.0	11.0
6	.0	.0	.0	---	.0	---	3.5	---	---	11.5	9.5	10.5
7	.0	.0	.0	---	.0	---	3.5	1.0	2.5	12.0	10.0	11.0
8	.0	.0	.0	---	.0	---	4.0	1.5	3.0	12.0	11.0	11.5
9	.0	.0	.0	---	.0	---	5.0	3.5	4.5	12.0	11.0	11.5
10	.0	.0	.0	---	.0	---	6.0	5.0	5.5	11.0	9.5	10.5
11	.0	.0	.0	---	.0	---	8.0	5.5	7.0	10.0	9.0	9.5
12	.0	.0	.0	---	.0	---	8.0	7.0	7.5	11.0	8.5	10.0
13	.0	.0	.0	---	.0	---	8.0	7.0	7.5	11.0	9.5	10.5
14	.0	.0	.0	---	.0	---	8.0	6.5	7.0	13.0	10.5	11.5
15	.0	.0	.0	---	.0	---	7.0	6.0	6.5	13.5	11.5	12.5
16	.0	.0	.0	---	.0	---	8.0	6.5	7.0	14.5	12.5	13.5
17	.0	.0	.0	---	.0	---	8.0	7.5	7.5	14.5	12.5	13.5
18	.0	.0	.0	---	.0	---	8.5	7.0	8.0	15.0	13.0	14.0
19	---	.0	---	---	.0	---	8.0	8.0	8.0	16.0	13.5	14.5
20	---	.0	---	---	.0	---	8.0	7.0	7.5	16.5	14.5	15.5
21	---	.0	---	---	---	---	7.5	5.0	7.0	17.5	15.0	16.0
22	---	.0	---	---	---	---	7.0	6.0	6.5	17.5	16.0	17.0
23	---	.0	---	---	---	---	7.0	5.5	6.0	18.0	16.5	17.5
24	---	.0	---	---	---	---	7.0	5.5	6.0	17.5	17.0	17.5
25	---	.0	---	---	---	---	7.5	5.5	6.5	18.0	16.5	17.5
26	---	.0	---	5.0	1.5	4.0	7.0	7.0	7.0	19.0	17.5	18.0
27	---	.0	---	6.0	3.5	5.0	8.0	6.5	7.5	18.0	17.5	17.5
28	---	.0	---	6.0	5.0	5.5	7.5	7.5	7.5	18.0	16.5	17.5
29	---	---	---	6.0	5.5	6.0	9.5	7.0	8.0	18.0	17.0	17.5
30	---	---	---	6.0	5.0	5.5	9.5	9.0	9.5	17.5	16.0	17.0
31	---	---	---	5.5	5.0	5.5	---	---	---	17.5	16.5	17.0
MONTH							9.5			19.0	8.5	13.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.0	16.0	16.5	21.0	19.0	20.0	23.0	20.5	22.0	23.5	23.0	23.5
2	17.0	15.5	16.0	22.0	20.5	21.0	23.0	21.0	22.5	22.5	21.5	22.0
3	17.5	16.0	16.5	22.5	21.0	21.5	24.0	21.5	23.0	21.5	20.5	21.0
4	18.5	16.5	17.5	23.5	21.0	22.0	24.0	21.0	23.0	21.0	20.0	20.5
5	19.5	17.5	18.5	24.0	22.0	22.5	24.5	23.0	23.5	21.0	19.5	20.0
6	19.5	18.0	18.5	24.5	22.5	23.5	24.0	22.0	23.5	19.5	18.5	18.5
7	19.0	18.0	18.5	---	---	---	23.5	23.0	23.0	18.5	18.0	18.5
8	19.0	17.5	18.0	---	---	---	23.5	21.5	23.0	18.0	17.5	17.5
9	19.0	18.0	18.5	---	---	---	24.0	21.5	23.5	17.5	16.5	17.0
10	19.5	17.5	18.0	---	---	---	24.0	21.5	23.5	17.5	16.0	16.5
11	20.0	17.5	18.5	---	---	---	24.0	21.5	23.5	18.0	17.5	17.5
12	21.0	18.0	19.0	---	---	---	24.5	21.5	23.5	18.5	17.0	17.5
13	---	---	---	---	---	---	24.5	22.5	24.0	19.0	17.5	18.0
14	---	---	---	---	---	---	24.0	22.0	23.5	19.0	18.0	18.5
15	---	---	---	---	---	---	24.0	24.0	24.0	18.0	17.5	17.5
16	---	---	---	---	---	---	23.5	22.5	23.0	17.0	15.5	16.5
17	20.0	18.0	19.0	---	---	---	23.5	22.5	22.5	15.5	15.0	15.0
18	19.0	17.5	18.5	---	---	---	24.5	23.0	23.5	15.0	14.0	14.5
19	19.5	17.5	18.5	---	---	---	24.5	23.0	24.0	14.0	13.5	14.0
20	19.0	17.5	18.0	---	---	---	24.5	23.0	23.5	14.0	13.0	13.5
21	17.5	16.5	17.0	---	---	---	24.5	23.0	23.5	13.5	12.5	13.0
22	17.5	16.5	17.0	---	---	---	24.0	23.5	23.5	13.0	11.5	12.5
23	18.0	16.5	17.0	---	---	---	24.0	23.0	23.5	12.5	11.5	12.0
24	18.0	17.0	17.5	---	---	---	24.5	23.5	24.0	12.5	12.0	12.5
25	17.5	16.5	17.0	---	---	---	24.5	24.0	24.0	12.5	12.0	12.5
26	20.0	16.5	18.5	---	---	---	24.0	23.5	24.0	13.0	12.5	12.5
27	19.0	17.5	18.0	---	---	---	23.5	23.0	23.5	12.5	12.0	12.5
28	18.5	17.0	17.5	---	---	---	23.5	23.0	23.5	12.0	11.0	11.5
29	20.0	17.5	18.5	---	---	---	23.0	22.5	23.0	11.5	10.0	11.0
30	20.5	18.0	19.0	---	---	---	23.5	22.5	23.0	11.5	9.0	10.5
31	---	---	---	---	---	---	24.5	23.0	23.5	---	---	---
MONTH							24.5	20.5	23.5	23.5	9.0	16.0

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW¼ SE¼ sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft (9 m) upstream from bridge on Forest Service Road 2231, 500 ft (152 m) downstream from Mormon Creek, 0.1 mi (0.2 km) east of Federal Forest Highway 13, and 3.2 mi (5.1 km) north of Nahma Junction.

DRAINAGE AREA.--183 mi² (474 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft (186.230 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 207 ft³/s (5.862 m³/s), 15.36 in/yr (390 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft (3.002 m); minimum, 35 ft³/s (0.99 m³/s) Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft (1.091 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,010 ft³/s (28.6 m³/s) Apr. 5, gage height, 7.93 ft (2.417 m); minimum, 61 ft³/s (1.73 m³/s) Sept. 23, 24, 25, 30, gage height, 3.84 ft (1.170 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	172	134	132	88	86	185	480	340	100	243	65	71
2	161	129	125	88	86	180	526	304	98	198	71	74
3	151	125	116	88	86	175	599	299	156	168	84	68
4	142	121	120	86	86	170	871	428	206	149	110	65
5	133	118	125	86	86	165	954	529	191	200	122	64
6	129	115	133	86	86	160	804	501	170	173	118	63
7	128	113	135	86	86	155	743	437	149	142	117	66
8	124	110	135	86	86	150	695	386	139	125	112	92
9	118	124	135	86	86	150	698	340	133	115	104	88
10	114	134	132	86	86	150	678	300	129	103	117	81
11	112	128	130	86	86	145	657	269	123	96	146	77
12	113	124	125	86	88	145	629	242	117	92	148	84
13	115	169	120	86	88	140	590	220	112	88	129	83
14	117	217	118	88	88	140	588	202	326	83	119	76
15	114	222	112	90	88	135	568	187	636	80	111	71
16	111	200	108	90	88	135	523	172	669	77	101	70
17	116	181	107	92	88	130	499	168	581	87	91	68
18	121	167	105	94	90	130	473	150	472	95	85	67
19	118	154	102	96	98	125	439	139	373	85	79	66
20	114	144	100	96	108	125	404	135	291	81	76	64
21	111	140	100	94	120	125	365	133	250	91	72	64
22	110	142	100	92	145	125	336	128	218	103	70	63
23	108	149	100	90	180	130	454	124	189	95	68	61
24	109	195	98	90	210	135	644	124	193	83	66	61
25	135	191	96	88	210	145	580	113	190	81	65	62
26	157	175	94	88	205	150	521	111	165	82	65	64
27	161	158	92	88	200	160	478	108	146	79	67	64
28	161	145	90	88	195	198	441	105	134	75	66	63
29	154	139	90	86	---	259	418	105	202	72	71	64
30	145	135	88	86	---	352	376	104	271	69	75	63
31	140	---	88	86	---	411	---	102	---	67	71	---
TOTAL	4014	4498	3451	2746	3235	5180	17031	7005	7129	3377	2861	2087
MEAN	129	150	111	88.6	116	167	568	226	238	109	92.3	69.6
MAX	172	222	135	96	210	411	954	529	669	243	148	92
MIN	108	110	88	86	86	125	336	102	98	67	65	61
CFSM	.71	.82	.61	.48	.63	.91	3.10	1.24	1.30	.60	.50	.38
IN.	.82	.91	.70	.56	.66	1.05	3.46	1.42	1.45	.69	.58	.42

CAL YR 1980 TOTAL 55496 MEAN 152 MAX 1010 MIN 60 CFSM .83 IN 11.28
WTR YR 1981 TOTAL 62614 MEAN 172 MAX 954 MIN 61 CFSM .94 IN 12.73

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW¼ sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft (5 m) upstream from county highway, 1.5 mi (2.4 km) downstream from Halfway Creek, and 0.3 mi (0.5 km) north of Humboldt.

DRAINAGE AREA.--46.0 mi^2 (119.1 km^2).

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft (463.662 m) Cleveland-Cliffs Iron Co. datum. Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good, except those for the winter period, which are fair. From July 1960 to June 1972, some diversion 100 ft (30 m) above station by industry for iron ore processing; figures of runoff adjusted. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 60.7 ft^3/s (1.719 m^3/s), 17.92 in/yr (455 mm/yr), adjusted for diversion 1960 to 1972.

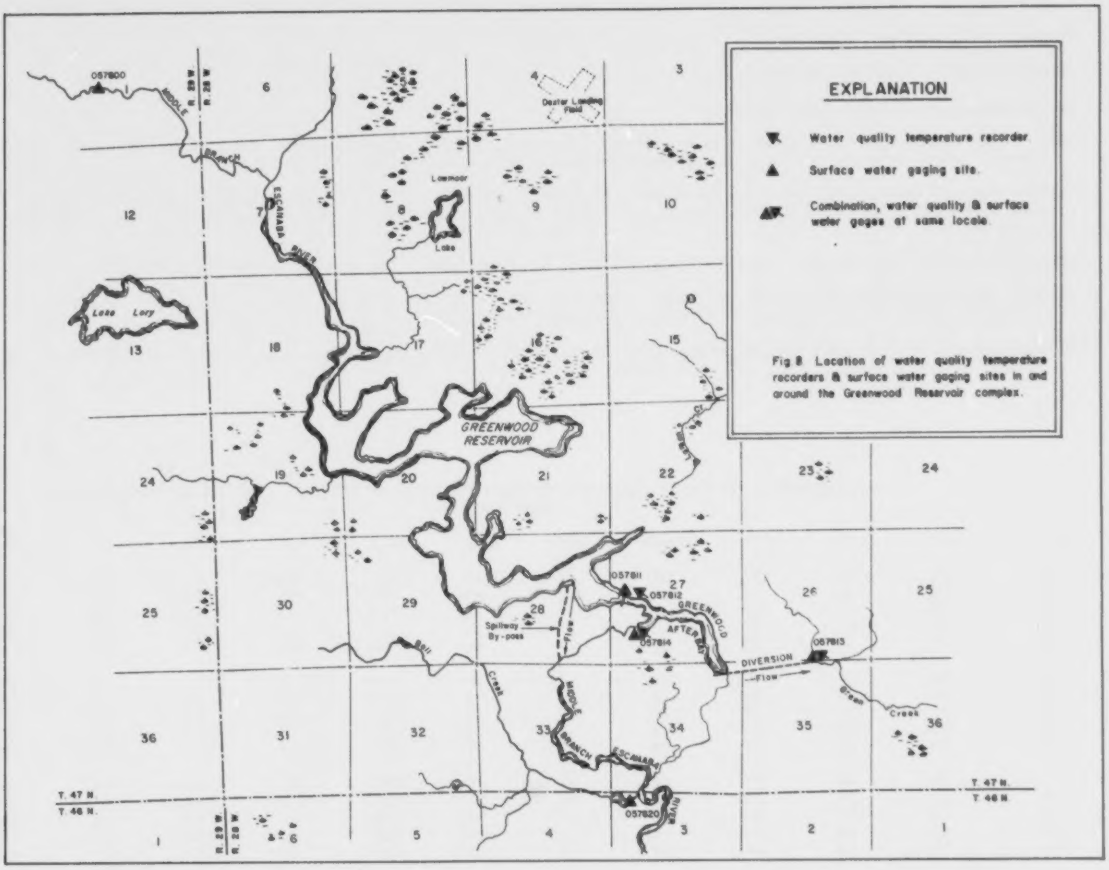
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft^3/s (46.4 m^3/s) Apr. 24, 1960, gage height, 8.30 ft (2.530 m), from floodmark; minimum, 4.0 ft^3/s (0.11 m^3/s) Sept. 12, 1976; minimum gage height, 1.07 ft (0.326 m) Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 402 ft^3/s (11.4 m^3/s) June 16, gage height, 5.22 ft (1.591 m); minimum, 11 ft^3/s (0.31 m^3/s) Sept. 7, gage height, 1.70 ft (0.518 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	43	27	18	17	40	251	88	54	51	13	15
2	55	40	27	18	17	40	275	80	55	45	15	14
3	52	39	26	18	17	39	313	87	89	41	16	14
4	47	39	25	18	17	36	343	149	94	39	23	13
5	41	37	25	18	17	36	337	271	75	38	19	13
6	38	35	25	18	17	35	295	324	63	33	17	12
7	34	34	26	18	17	33	265	235	53	30	34	16
8	32	32	28	18	17	32	241	174	121	27	34	26
9	30	39	28	18	17	31	234	139	179	28	36	21
10	29	41	27	18	17	28	252	117	131	24	60	17
11	31	38	27	18	17	28	330	101	94	22	70	15
12	37	37	28	18	17	28	338	90	88	21	49	16
13	42	47	26	18	17	26	279	81	73	21	36	14
14	41	49	25	18	17	25	259	73	128	19	30	13
15	37	43	24	18	19	24	234	66	240	18	25	12
16	35	39	24	18	21	25	196	62	364	17	21	14
17	39	38	23	18	22	25	174	57	334	18	18	22
18	40	35	22	18	23	25	159	53	217	19	16	23
19	37	33	22	19	25	25	140	50	139	17	16	19
20	35	32	21	19	26	25	119	47	112	18	14	16
21	36	33	21	19	29	24	102	44	113	21	14	14
22	34	33	21	19	32	24	94	42	101	18	13	13
23	35	33	20	18	41	24	137	40	87	16	13	13
24	47	31	20	18	46	26	205	42	81	15	13	12
25	78	31	20	18	46	28	191	45	77	21	12	13
26	85	28	20	18	43	33	154	76	65	21	14	14
27	71	27	19	18	42	39	133	72	56	17	17	14
28	59	27	19	18	42	60	125	62	51	18	16	14
29	50	28	19	17	---	109	111	57	64	14	15	13
30	46	27	19	17	---	156	97	68	60	15	14	13
31	45	---	19	17	---	200	---	60	---	13	14	---
TOTAL	1378	1068	723	559	695	1329	6383	2952	3458	735	717	458
MEAN	44.5	35.6	23.3	18.0	24.8	42.9	213	95.2	115	23.7	23.1	15.3
MAX	85	49	28	19	46	200	343	324	364	51	70	26
MIN	29	27	19	17	17	24	94	40	51	13	12	12
CFSM	.97	.77	.51	.39	.54	.93	4.63	2.07	2.50	.52	.50	.33
IN.	1.11	.86	.58	.45	.56	1.07	5.16	2.39	2.80	.59	.58	.37

CAL YR 1980 TOTAL 15749 MEAN 43.0 MAX 306 MIN 11 CFSM .94 IN 12.74
WTR YR 1981 TOTAL 20455 MEAN 56.0 MAX 364 MIN 12 CFSM 1.22 IN 16.54


EXPLANATION
▼ Water quality temperature recorder
▲ Surface water gaging site.
▲▼ Combination, water quality & surface water gages at same locale.
057800
R. 29 W
R. 28 W
MIDDLE BRANCH
ESCANABA RIVER
Lake Lory
Lowmoor
Lake
Dexter Landing Field
GREENWOOD RESERVOIR
057811
057812
GREENWOOD AFTERBAY
057814
Spillway By-pass
Flow
DIVERSION
Flow
057813
Green Creek
Bell Creek
MIDDLE BRANCH ESCANABA RIVER
057820
T. 47 N.
T. 46 N.
1
6
4
3
7
8
9
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17
16
15
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2
1

Fig 8. Location of water quality temperature recorders & surface water gaging sites in and around the Greenwood Reservoir complex.

Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm^3) at a spillway elevation of 1515 ft (461.8 m). At pool elevation exceeding 1515 ft (461.8 m), water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057813), and the gaging station below the release from the afterbay to Middle Branch Escanaba River (Greenwood Release, 04057814).

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi (6.0 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2 (174.6 km^2).

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft (246.720 m) National Geodetic Vertical Datum of 1929 (levels by Cleveland-Cliffs Iron Co.); gage readings have been reduced to elevations NGVD. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm^3) at spillway elevation 1,515 ft (461.8 m). Above elevation of 1,515 ft (461.8 m), water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft (610 m) below Greenwood Release (station 04057814). The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft (518,000 m^3) at elevation 1,480 ft (451.1 m). Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,400 acre-ft (31.3 hm^3) Apr. 26, 27, 1979, elevation, 1,516.5 ft (462.23 m); minimum since first filling, 3,240 acre-ft (3.99 hm^3) Mar. 12, 1977, elevation, 1,491.1 ft (454.49 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 24,420 acre-ft (30.1 hm^3) Apr. 12, 13, elevation, 1,515.8 ft (462.02 m); minimum, 19,020 acre-ft (23.5 hm^3) Sept. 30, elevation, 1,511.6 ft (460.74 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	1515.3	23720	--	--
Oct. 31	1515.1	23440	-280	-4.6
Nov. 30	1515.0	23300	-140	-2.4
Dec. 31	1514.8	23040	-260	-4.2
CAL YR 1980	--	--	-260	-0.4
Jan. 31	1513.8	21740	-1300	-21.1
Feb. 28	1513.2	20960	-780	-14.0
Mar. 31	1514.2	22260	+1300	+21.1
Apr. 30	1515.3	23720	+1460	+24.5
May 31	1515.1	23440	-280	-4.6
June 30	1515.2	23580	+140	+2.4
July 31	1513.9	21870	-1710	-27.8
Aug. 31	1513.1	20830	-1040	-16.9
Sept. 30	1511.6	19020	-1810	-30.4
WTR YR 1981	--	--	-4700	-6.5

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 mi (5.6 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Flow regulated by the multi-port outlets of Greenwood Reservoir. Altitude of outlets are: (No. 1) 1,505 ft (458.7 m), (No. 2) 1,495 ft (455.7 m), (No. 3) 1,485 ft (452.6 m), (No. 4) 1,478 ft (450.5 m) above mean sea level. Outlet No. 3 was open Oct. 1 to Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, 0.0°C on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 17.0°C Aug. 14, 15; minimum, 2.0°C Jan. 28 to Mar. 11.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	13.0	6.5	6.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
2	13.5	13.0	6.0	6.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
3	13.5	13.5	6.0	6.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
4	13.5	13.0	6.0	6.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
5	13.0	12.5	6.0	5.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
6	12.5	12.5	5.5	5.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
7	12.5	12.0	5.5	5.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
8	12.0	12.0	5.0	5.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
9	12.0	11.5	5.5	4.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
10	11.5	11.5	4.5	4.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
11	11.5	11.5	4.0	3.5	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.0
12	11.5	11.0	3.5	3.5	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
13	11.0	11.0	3.5	3.5	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
14	11.0	11.0	3.5	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
15	11.0	10.5	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
16	10.5	10.5	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
17	10.5	10.5	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
18	10.5	10.5	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
19	10.5	10.0	3.0	3.0	3.0	3.0	3.0	2.5	2.0	2.0	2.5	2.5
20	10.0	10.0	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
21	10.0	9.5	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
22	9.5	9.5	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
23	9.5	9.0	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
24	9.0	9.0	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
25	9.0	8.5	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
26	8.5	7.5	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
27	7.5	7.5	3.0	3.0	3.0	3.0	2.5	2.5	2.0	2.0	2.5	2.5
28	7.5	7.0	3.0	3.0	3.0	3.0	2.5	2.0	2.0	2.0	2.5	2.5
29	7.0	7.0	3.0	3.0	3.0	3.0	2.0	2.0	---	---	2.5	2.5
30	7.0	7.0	3.0	3.0	3.0	3.0	2.0	2.0	---	---	2.5	2.5
31	7.0	6.5	---	---	3.0	3.0	2.0	2.0	---	---	2.5	2.5
MONTH	13.5	6.5	6.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.5	2.0

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	2.5	6.5	6.0	10.5	10.0	15.5	15.0	15.5	15.5	16.5	16.5
2	2.5	2.5	6.5	6.0	10.5	10.5	15.0	15.0	15.5	15.5	16.5	16.5
3	2.5	2.5	6.5	6.0	10.5	10.5	15.0	15.0	16.0	15.5	16.5	16.5
4	2.5	2.5	6.5	6.5	10.5	10.5	15.5	15.0	16.0	16.0	16.5	16.0
5	2.5	2.5	7.5	6.5	11.0	10.5	15.5	15.5	16.0	16.0	16.0	16.0
6	2.5	2.5	7.5	7.5	11.0	10.5	15.5	15.5	16.5	16.0	16.0	16.0
7	2.5	2.5	7.5	7.5	11.0	11.0	15.5	15.5	16.5	16.0	16.0	16.0
8	2.5	2.5	7.5	7.5	11.5	11.0	15.5	15.5	16.5	16.0	16.0	16.0
9	2.5	2.5	8.5	7.5	11.5	11.5	15.5	15.0	16.5	16.0	16.0	15.5
10	2.5	2.5	8.5	8.5	11.5	11.5	15.0	15.0	16.5	16.5	15.5	15.0
11	2.5	2.5	9.0	8.5	12.0	11.5	15.0	15.0	16.5	16.5	15.5	15.0
12	3.0	2.5	9.0	9.0	12.0	11.5	15.0	15.0	16.5	16.5	15.5	15.5
13	3.0	3.0	9.5	9.0	12.5	12.0	15.0	15.0	16.5	16.5	15.5	15.5
14	3.0	3.0	9.0	9.0	12.5	12.0	15.0	15.0	17.0	16.5	15.5	15.5
15	3.5	3.0	9.0	9.0	12.5	12.5	15.5	15.0	17.0	16.5	15.5	15.5
16	3.5	3.5	9.5	9.0	12.5	12.5	15.5	15.5	16.5	16.5	15.5	15.5
17	4.5	3.5	9.5	9.5	12.5	12.5	15.5	15.5	16.5	16.5	15.5	15.5
18	4.5	4.0	9.5	9.5	13.5	12.5	15.5	15.5	16.5	16.5	15.5	15.0
19	4.5	4.5	9.5	9.5	14.0	13.5	15.5	15.5	16.5	16.5	15.0	15.0
20	4.5	4.5	9.5	9.5	14.0	13.5	15.5	15.5	16.5	16.5	15.0	14.5
21	4.5	4.5	9.5	9.0	14.5	14.0	15.5	15.5	16.5	16.5	14.5	14.5
22	4.5	4.5	9.5	9.0	14.5	14.0	15.5	15.5	16.5	16.5	14.5	14.5
23	5.0	4.5	10.0	9.5	14.5	14.5	15.5	15.5	16.5	16.5	14.5	14.5
24	5.0	5.0	9.5	9.5	15.0	14.5	15.5	15.5	16.5	16.5	14.5	14.0
25	5.5	5.0	9.5	9.5	15.0	15.0	15.5	15.5	16.5	16.5	14.0	14.0
26	5.0	5.0	10.0	9.5	15.0	15.0	15.5	15.5	16.5	16.5	14.0	14.0
27	5.5	5.0	10.0	10.0	15.0	15.0	15.5	15.0	16.5	16.5	14.0	13.5
28	5.5	5.5	10.0	10.0	15.0	15.0	15.5	15.0	16.5	16.5	13.5	13.0
29	6.0	5.5	10.0	10.0	15.0	15.0	15.5	15.0	16.5	16.5	13.0	12.5
30	6.0	6.0	10.0	10.0	15.0	15.0	15.5	15.5	16.5	16.5	12.5	12.5
31	---	---	10.0	10.0	---	---	15.5	15.5	16.5	16.5	---	---
MONTH	6.0	2.5	10.0	6.0	15.0	10.0	15.5	15.0	17.0	15.5	16.5	12.5

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW¼ NE¼ sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft (61 m) upstream from Green Creek, 0.7 mi (1.1 km) downstream from Greenwood Afterbay, and 3.6 mi (5.8 km) south of Greenwood.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,460 ft (445 m) from topographic map (nearest 10 ft). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records excellent. Flow completely regulated. A pipeline, 0.7 mi (1.1 km) long, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing; some returned to Middle Branch Escanaba River 27 mi (43 km) below station via another Green Creek (station 04058130); some returned 31 mi (50 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft³/s (0.85 m³/s) June 25-28, 1977, Nov. 9, 1979; no flow Dec. 27, 1972 to Jan. 6, 1973; minimum daily discharge since diversion began, 0.02 ft³/s (0.001 m³/s) Nov. 3-22, 1977.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.8	27	14	21	27	18	13	5.2	22	23	23	23
2	2.8	27	14	21	27	16	13	5.1	22	23	23	23
3	2.8	27	14	21	27	14	13	5.2	22	23	23	23
4	2.8	27	14	21	27	14	13	5.2	22	23	23	22
5	2.8	27	14	21	27	14	13	5.2	22	23	23	23
6	2.8	27	14	21	27	14	9.0	5.2	22	23	23	23
7	12	27	14	21	27	13	7.2	5.2	22	23	23	23
8	20	27	14	21	27	12	6.4	5.1	22	23	23	23
9	23	27	14	21	25	12	5.2	5.1	22	23	23	23
10	27	27	14	21	23	12	5.1	5.0	22	23	23	23
11	27	27	14	21	23	12	5.1	5.1	22	22	23	23
12	27	27	14	20	23	12	5.1	5.0	22	22	23	23
13	27	27	14	20	23	12	5.1	5.0	22	22	23	23
14	27	27	14	20	23	12	5.1	5.0	23	23	23	23
15	27	27	14	20	23	12	5.1	5.1	23	23	23	23
16	27	27	14	21	23	12	5.1	5.1	23	23	23	23
17	27	27	14	21	23	12	5.1	5.1	23	22	23	23
18	27	27	14	21	23	12	5.1	5.1	22	22	23	23
19	27	27	13	21	23	12	5.1	9.0	22	22	23	23
20	27	27	13	21	23	12	5.1	11	22	23	22	23
21	27	27	13	21	23	12	5.1	13	22	23	22	22
22	27	27	13	23	23	12	5.1	15	22	23	22	20
23	27	27	13	27	20	12	5.2	16	22	23	22	20
24	27	21	13	27	17	12	5.2	20	22	23	22	20
25	27	14	13	27	18	12	5.2	21	22	23	22	20
26	27	14	14	27	18	12	5.2	22	22	23	22	20
27	27	14	14	26	18	12	5.2	23	22	23	22	20
28	27	14	14	27	18	12	5.2	23	22	23	23	20
29	27	14	14	27	---	12	5.2	23	23	23	23	20
30	27	14	16	27	---	12	5.2	23	23	23	23	20
31	27	---	21	27	---	12	---	22	---	23	23	---
TOTAL	665.8	726	436	702	649	391	200.7	333.0	666	707	705	661
MEAN	21.5	24.2	14.1	22.6	23.2	12.6	6.69	10.7	22.2	22.8	22.7	22.0
MAX	27	27	21	27	27	18	13	23	23	23	23	23
MIN	2.8	14	13	20	17	12	5.1	5.0	22	22	22	20

CAL YR 1980 TOTAL 6423.54 MEAN 17.6 MAX 28 MIN .60
WTR YR 1981 TOTAL 6842.50 MEAN 18.7 MAX 27 MIN 2.8

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 31, 1973.

REMARKS.--Flow regulated by inlet structure of pipeline from Greenwood Afterbay 0.7 mi (1.1 km) upstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C July 18, 19, 1974; minimum, 0.5°C on many days during winter periods 1977, 1978.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.5°C July 9-12, 14; minimum, 1.5°C Jan. 17-25, Feb. 5-17.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBFR		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	10.0	10.0	3.5	3.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
2	10.0	10.0	3.5	3.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
3	10.0	10.0	3.5	3.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
4	10.0	9.0	3.5	3.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0
5	9.0	8.0	3.5	3.5	3.0	3.0	2.5	2.5	2.0	1.5	2.0	2.0
6	8.0	8.0	4.0	3.5	3.0	3.0	2.5	2.5	1.5	1.5	2.0	2.0
7	8.0	8.0	4.0	4.0	3.0	3.0	2.5	2.5	1.5	1.5	2.0	2.0
8	9.0	8.0	4.0	4.0	3.0	3.0	2.5	2.5	1.5	1.5	2.0	2.0
9	9.0	8.5	4.0	3.0	3.0	3.0	2.5	2.0	1.5	1.5	2.5	2.0
10	8.5	8.5	3.0	2.5	3.0	3.0	2.0	2.0	1.5	1.5	2.5	2.5
11	9.0	8.5	2.5	2.5	3.0	3.0	2.0	2.0	1.5	1.5	2.5	2.5
12	8.5	8.0	2.5	2.5	3.0	2.5	2.0	2.0	1.5	1.5	2.5	2.5
13	8.0	8.0	2.5	2.5	2.5	2.5	2.0	2.0	1.5	1.5	2.5	2.5
14	8.0	7.5	3.0	2.5	2.5	2.5	2.0	2.0	1.5	1.5	2.5	2.5
15	7.5	7.5	3.0	3.0	2.5	2.5	2.0	2.0	1.5	1.5	2.5	2.5
16	7.5	7.0	3.0	2.5	2.5	2.5	2.0	2.0	1.5	1.5	2.5	2.5
17	7.5	7.0	2.5	2.5	2.5	2.5	2.0	1.5	2.0	1.5	2.5	2.5
18	8.0	7.5	2.5	2.5	2.5	2.5	1.5	1.5	2.0	2.0	2.5	2.5
19	8.0	7.5	2.5	2.5	3.0	2.5	1.5	1.5	2.0	2.0	2.5	2.5
20	7.5	7.0	2.5	2.5	3.0	3.0	1.5	1.5	2.5	2.5	2.5	2.5
21	7.0	6.5	2.5	2.5	3.0	3.0	1.5	1.5	2.5	2.5	2.5	2.0
22	6.5	6.0	2.5	2.5	3.0	2.5	1.5	1.5	2.5	2.5	2.0	2.0
23	6.0	5.5	2.5	2.5	2.5	2.5	1.5	1.5	2.5	2.5	2.0	2.0
24	5.5	5.5	2.5	2.5	2.5	2.5	1.5	1.5	2.5	2.5	2.5	2.0
25	5.5	5.5	3.0	2.5	2.5	2.5	2.0	1.5	2.5	2.0	2.5	2.5
26	5.5	4.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	2.5
27	4.5	4.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	3.0
28	4.5	4.0	3.0	3.0	2.5	2.5	2.0	2.0	2.0	2.0	3.0	3.0
29	4.0	3.5	3.0	3.0	2.5	2.5	2.0	2.0	---	---	3.0	3.0
30	3.5	3.5	3.0	3.0	2.5	2.5	2.0	2.0	---	---	3.0	3.0
31	3.5	3.5	---	---	2.5	2.5	2.0	2.0	---	---	3.0	3.0
MONTH	10.0	3.5	4.0	2.5	3.0	2.5	2.5	1.5	2.5	1.5	3.0	2.0

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.0	3.0	6.5	6.5	12.5	12.0	16.5	16.0	17.5	17.5	17.0	17.0
2	3.0	3.0	7.0	6.5	12.0	12.0	16.5	16.5	17.5	17.5	17.0	16.0
3	3.0	3.0	8.0	7.0	12.0	12.0	17.0	16.5	17.5	17.5	16.0	16.0
4	3.5	3.0	8.0	8.0	12.0	12.0	17.0	17.0	18.0	17.5	16.0	16.0
5	3.5	3.5	9.0	8.0	12.5	12.0	17.0	17.0	18.0	17.5	16.5	15.5
6	3.5	3.5	9.0	9.0	13.0	12.5	17.5	17.0	18.0	17.5	15.5	15.0
7	3.5	3.5	9.0	8.5	13.5	13.0	17.5	17.5	18.0	17.0	15.5	15.0
8	3.5	3.5	8.5	8.5	13.5	13.0	18.0	17.5	17.0	17.0	16.0	15.5
9	3.5	3.5	10.5	8.5	13.5	13.0	18.5	18.0	17.0	16.5	15.5	14.5
10	3.5	3.5	10.5	9.5	13.5	13.0	18.5	18.0	17.0	17.0	14.5	14.5
11	3.5	3.5	10.0	9.5	14.0	13.5	18.5	18.0	17.0	17.0	15.0	14.5
12	3.5	3.5	10.5	10.5	14.0	14.0	18.5	18.0	17.0	17.0	15.5	15.0
13	3.5	3.5	10.5	10.0	14.5	14.0	18.0	18.0	17.0	17.0	15.5	15.5
14	4.0	3.5	10.0	10.0	14.5	14.5	18.5	18.0	17.5	17.0	16.0	15.5
15	4.0	4.0	10.5	10.0	14.5	14.5	18.0	17.0	18.0	17.5	16.0	15.5
16	4.0	4.0	10.5	10.0	14.5	14.5	17.5	17.0	18.0	16.5	15.5	14.5
17	6.0	4.0	10.5	10.5	14.5	14.0	17.0	17.0	17.0	16.5	14.5	14.0
18	7.0	5.5	11.0	10.5	15.0	14.0	17.5	17.0	17.0	16.5	14.0	13.5
19	7.0	6.0	11.0	11.0	15.5	15.0	17.0	17.0	17.0	17.0	14.0	13.5
20	7.0	6.5	11.5	11.0	15.5	15.5	17.5	17.0	17.0	16.5	14.0	13.5
21	6.5	6.5	11.5	11.5	15.5	14.5	17.5	16.5	17.0	17.0	13.5	13.0
22	6.5	6.5	11.5	11.5	15.0	14.5	17.0	16.5	17.0	17.0	13.0	12.0
23	6.5	6.5	12.5	11.5	15.0	15.0	17.0	16.5	17.0	17.0	12.0	12.0
24	6.5	6.0	12.5	12.5	15.0	15.0	17.0	17.0	17.5	17.0	12.0	12.0
25	6.0	6.0	12.5	12.5	15.5	15.0	17.5	17.0	17.5	17.5	12.0	12.0
26	6.0	6.0	12.5	11.5	15.5	15.5	17.5	17.0	17.5	17.0	12.0	12.0
27	6.0	6.0	11.5	11.0	15.5	15.5	17.5	16.5	17.0	17.0	12.0	11.5
28	6.0	6.0	11.5	11.0	16.0	15.5	17.0	16.5	17.0	17.0	11.5	11.0
29	6.0	6.0	12.0	11.5	16.0	16.0	17.0	17.0	17.0	17.0	11.0	10.5
30	6.0	6.0	12.0	11.5	16.5	16.0	17.0	17.0	17.0	17.0	10.5	10.5
31	---	---	12.0	12.0	---	---	17.5	17.0	17.0	17.0	---	---
MONTH	7.0	3.0	12.5	6.5	16.5	12.0	18.5	16.0	18.0	16.5	17.0	10.5

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi (4.2 km) upstream from Bell Creek and 3.8 mi (6.1 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,480 ft (451 m) from topographic map (nearest 10 ft). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Water-discharge records excellent. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft (462 m) is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water diverted immediately above this station via Greenwood Diversion (station 04057813) for iron ore processing and some returned to Middle Branch Escanaba River 27 mi (43 km) downstream via another Green Creek (station 04058130). Since October 1979, some of the diversion returned 31 mi (50 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Overflow from the reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi (0.8 km) downstream from this station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft³/s (8.21 m³/s) Oct. 1, 1972; (since regulation began), 63 ft³/s (1.78 m³/s) July 10, 11, 1974; minimum daily, 10 ft³/s (0.28 m³/s) Dec. 29, 30, 1972, result of construction.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	25	25	26	25	26	28	27	26	27	26	25
2	26	25	25	26	25	26	28	27	26	26	26	25
3	26	25	25	26	25	26	28	27	26	26	26	25
4	26	25	26	26	25	26	29	27	26	26	26	25
5	26	25	26	26	25	25	29	28	26	26	26	25
6	26	25	26	26	25	25	29	27	26	26	26	25
7	26	25	26	26	25	25	28	27	26	26	26	25
8	26	25	26	26	25	26	28	26	26	26	26	25
9	27	25	26	26	25	26	27	26	26	26	26	25
10	27	25	26	26	25	26	26	26	26	26	26	25
11	27	25	26	26	25	26	26	25	26	26	26	25
12	27	25	26	26	25	26	26	25	26	26	26	25
13	26	25	26	25	25	26	26	25	26	26	26	25
14	26	25	26	25	25	26	26	25	26	26	26	25
15	26	25	26	25	25	26	26	25	27	26	26	25
16	26	25	26	25	25	26	26	25	26	26	26	25
17	26	25	26	25	25	26	26	25	26	26	26	25
18	26	25	25	25	25	26	25	26	26	26	26	25
19	26	25	25	25	25	26	25	26	26	26	26	25
20	26	25	25	25	25	26	25	26	26	26	25	25
21	26	25	25	25	25	26	26	26	26	26	25	25
22	26	25	25	26	25	26	26	26	26	26	25	25
23	26	25	25	26	26	26	26	26	26	26	25	26
24	26	25	25	26	26	26	27	26	26	26	25	26
25	26	25	26	25	26	26	27	27	26	26	25	26
26	26	25	26	25	26	26	27	27	26	26	25	27
27	26	25	26	25	26	26	27	27	26	26	25	26
28	26	25	26	25	26	26	27	27	26	26	25	27
29	26	25	26	25	---	26	27	26	27	26	25	27
30	26	25	26	25	---	27	27	26	27	26	25	27
31	25	---	26	25	---	27	---	26	---	26	25	---
TOTAL	809	750	796	790	706	805	804	811	783	807	794	762
MEAN	26.1	25.0	25.7	25.5	25.2	26.0	26.8	26.2	26.1	26.0	25.6	25.4
MAX	27	25	26	26	26	27	29	28	27	27	26	27
MIN	25	25	25	25	25	25	25	25	26	26	25	25

CAL YR 1980 TOTAL 9318 MEAN 25.5 MAX 28 MIN 22
WTR YR 1981 TOTAL 9417 MEAN 25.8 MAX 29 MIN 25

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Sept. 1, 1973.

REMARKS.--Flow regulated by valve at outlet of Greenwood Afterbay.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 23.5°C July 14, 15, 1974; minimum, 0.0°C Mar. 24, 25, 1979.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.5°C July 6, 9, 13, Aug. 4, 23; minimum, 0.5°C Apr. 5.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.0	14.0	5.5	5.0	2.5	2.5	3.0	3.0	2.0	2.0	1.5	1.5
2	14.0	12.5	5.0	5.0	2.5	2.5	3.0	3.0	2.0	2.0	1.5	1.0
3	12.5	12.0	5.0	5.0	2.5	2.5	3.0	3.0	2.0	2.0	2.0	1.5
4	12.0	11.5	5.0	4.5	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0
5	12.0	11.0	4.5	4.0	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0
6	12.0	11.0	4.5	4.5	3.0	2.5	3.0	3.0	2.0	2.0	2.0	2.0
7	12.0	11.0	4.5	4.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
8	13.0	11.5	4.5	3.5	3.0	2.5	3.0	3.0	2.0	2.0	2.0	2.0
9	12.0	11.0	3.5	3.5	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0
10	12.0	11.5	3.5	3.0	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0
11	12.0	11.0	3.0	3.0	3.0	2.5	3.0	3.0	2.0	2.0	2.0	2.0
12	11.0	10.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
13	10.5	10.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	1.5
14	10.5	10.0	3.0	2.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	1.5
15	10.5	10.0	2.5	2.5	3.0	3.0	3.0	3.0	2.0	2.0	2.0	1.5
16	10.0	9.5	2.5	2.5	3.0	3.0	3.0	2.5	2.0	2.0	1.5	1.5
17	10.5	10.0	2.5	2.5	3.0	3.0	2.5	2.5	2.0	2.0	2.0	1.5
18	10.5	9.5	2.5	2.5	3.0	3.0	2.5	2.0	2.0	2.0	1.5	1.5
19	9.5	9.0	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0	1.5	1.5
20	9.0	9.0	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0	1.5	1.5
21	9.0	8.5	2.5	2.5	3.5	3.0	2.0	2.0	2.0	2.0	1.5	1.5
22	8.5	8.0	2.5	2.5	3.5	3.5	2.0	2.0	2.0	2.0	1.5	1.5
23	8.5	8.0	2.5	2.5	3.5	3.5	2.0	2.0	2.0	2.0	2.0	1.5
24	8.0	8.0	2.5	2.5	3.5	3.5	2.0	2.0	2.0	1.5	2.0	1.5
25	8.0	7.5	2.5	2.5	3.5	3.5	2.0	2.0	1.5	1.5	2.0	1.5
26	7.5	6.0	2.5	2.5	3.5	3.0	2.0	2.0	2.0	1.5	2.0	1.5
27	6.5	6.0	2.5	2.5	3.0	3.0	2.0	2.0	2.0	2.0	2.0	1.0
28	6.5	5.5	2.5	2.5	3.0	3.0	2.0	2.0	2.0	1.5	2.5	2.0
29	6.0	5.5	2.5	2.5	3.0	3.0	2.0	2.0	---	---	2.5	2.0
30	6.0	5.5	2.5	2.5	3.0	3.0	2.0	2.0	---	---	2.0	1.5
31	6.0	5.5	---	---	3.0	3.0	2.0	2.0	---	---	2.0	1.5
MONTH	14.0	5.5	5.5	2.5	3.5	2.5	3.0	2.0	2.0	1.5	2.5	1.0

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	2.0	8.5	5.5	12.0	10.0	17.0	15.0	17.0	16.0	17.0	17.0
2	2.5	1.5	7.0	6.0	11.5	10.0	17.0	15.0	17.0	16.0	17.0	16.0
3	3.0	2.0	7.0	6.5	12.0	10.5	16.0	15.0	17.5	16.0	17.5	16.0
4	3.0	1.0	7.5	6.5	12.5	10.5	17.5	15.0	18.5	16.5	17.0	16.5
5	2.5	.5	9.0	7.0	13.0	11.0	17.5	15.0	17.5	16.0	16.5	16.0
6	3.0	2.0	10.5	7.5	13.5	10.5	18.5	15.5	17.0	16.5	16.5	16.0
7	3.0	2.5	10.5	7.5	12.5	10.5	17.5	15.5	16.5	16.0	16.5	16.0
8	2.5	2.5	9.0	8.0	12.5	11.0	17.5	15.5	17.5	16.0	16.5	15.5
9	4.0	3.0	9.0	7.5	13.0	11.0	18.5	15.5	17.0	16.0	17.0	15.0
10	5.0	3.5	9.0	7.0	14.0	11.5	17.5	15.0	17.5	16.0	17.5	15.5
11	5.0	3.5	10.0	8.0	13.5	11.5	17.0	15.5	18.0	16.0	17.0	16.0
12	4.5	3.5	11.0	8.0	15.0	12.0	17.0	15.5	17.5	16.0	17.0	15.5
13	4.5	4.0	12.0	8.5	13.5	12.5	18.5	15.5	17.0	16.5	17.5	15.5
14	4.5	3.5	11.5	9.0	13.5	12.5	17.0	15.0	17.0	16.5	17.0	15.5
15	5.0	3.0	12.5	9.5	14.5	13.0	16.0	15.0	17.5	16.5	16.5	15.5
16	5.5	4.0	12.0	10.0	13.5	12.5	16.0	15.5	18.0	15.5	16.0	15.0
17	6.5	5.0	11.5	9.0	13.5	12.0	17.5	15.5	18.0	16.0	16.0	15.0
18	6.5	4.5	12.0	9.0	15.0	13.0	17.5	15.5	18.0	16.0	15.5	15.0
19	5.5	5.0	12.0	9.5	16.0	13.0	17.5	15.5	18.0	16.0	15.5	15.0
20	5.5	4.0	12.5	10.0	14.5	13.5	16.5	16.0	17.5	16.5	15.5	14.5
21	5.5	4.5	13.5	10.0	15.5	13.5	17.5	15.0	17.5	16.5	15.0	14.5
22	5.5	5.0	11.0	9.5	16.0	14.0	16.5	15.0	17.5	16.5	14.5	14.0
23	5.0	4.5	12.0	10.0	15.5	13.5	17.0	15.5	18.5	16.5	14.5	13.5
24	5.0	4.0	11.5	10.0	15.0	14.0	16.5	15.5	18.0	16.5	14.5	14.0
25	7.0	4.5	11.0	10.5	16.5	14.0	17.5	15.5	17.5	16.5	14.0	14.0
26	6.5	5.0	10.5	10.0	17.0	14.0	17.5	15.0	17.0	16.5	14.0	14.0
27	6.0	5.0	11.5	9.5	15.5	14.5	17.0	15.0	17.0	16.5	14.0	13.0
28	6.0	5.5	12.5	10.0	15.0	14.5	17.0	15.5	17.5	16.5	13.0	12.0
29	8.0	5.0	12.5	10.0	16.5	14.5	17.0	15.5	17.5	17.0	13.0	12.5
30	7.0	6.0	13.0	10.0	16.5	14.5	17.0	15.5	17.5	17.0	12.5	12.0
31	---	---	12.5	10.0	---	---	18.0	16.0	17.0	17.0	---	---
MONTH	8.0	.5	13.5	5.5	17.0	10.0	18.5	15.0	18.5	15.5	17.5	12.0

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI

LOCATION.--Lat 46°25'12", long 87°47'50", in NW¼ sec.3, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) downstream from county highway bridge, 100 ft (30 m) downstream from Bell Creek and 5.0 mi (8.0 km) southwest of Greenwood.

DRAINAGE AREA.--73.3 mi² (189.8 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-72, and annual maximum, water years 1970-72, October 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,400 ft (427 m) from topographic map (nearest 10 ft). October 2, 1960 to Sept. 20, 1973, nonrecording gage and Sept. 11, 1969 to Sept. 20, 1973, crest-stage gage at present site and datum.

REMARKS.--Records good except those for winter period, which are fair. Since December 1972, considerable regulation 2.1 mi (3.4 km) upstream (station 04057814) and 2.6 mi (4.2 km) upstream (station 04057811). Since January 1973, flow diverted 2.3 mi (3.7 km) upstream at Greenwood Afterbay, to Green Creek (station 04057813) for iron ore processing and some returned to Middle Branch Escanaba River 24 mi (39 km) downstream via another Green Creek (station 04058130). Since October 1979, some diversion returned 28 mi (45 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 83.6 ft³/s (2.368 m³/s), 15.49 in/yr (393 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,130 ft³/s (32.0 m³/s) Apr. 26, 1979, gage height, 13.40 ft (4.084 m); minimum observed, 8.62 ft³/s (0.24 m³/s) Aug. 22, 1962, discharge measurement; minimum daily, 12 ft³/s (0.34 m³/s) Dec. 28, 1972, Jan. 2-4, Nov. 5, 1973, result of construction upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 433 ft³/s (12.3 m³/s) Apr. 13, gage height, 10.64 ft (3.243 m); minimum daily, 25 ft³/s (0.71 m³/s) Nov. 8, Nov. 20 to Dec. 10, Jan. 26, 27, Aug. 17, 22, Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	33	25	26	27	29	51	117	54	82	27	27
2	81	30	25	26	26	29	51	100	52	67	27	26
3	74	29	25	26	26	28	105	109	62	55	27	26
4	68	28	25	26	26	28	278	174	74	47	27	26
5	59	27	25	26	26	27	395	272	76	40	27	26
6	55	26	25	26	26	27	395	349	72	35	28	26
7	49	26	25	26	26	26	381	362	62	32	30	28
8	42	25	25	26	26	27	358	300	68	30	28	27
9	34	27	25	26	26	27	325	237	84	31	30	26
10	31	28	25	26	26	27	327	182	111	30	33	25
11	30	27	26	26	26	27	358	148	106	29	32	26
12	28	26	26	26	26	27	417	123	100	29	29	26
13	27	29	26	26	26	28	417	103	88	29	27	26
14	26	32	26	26	26	29	372	92	123	29	27	26
15	26	32	26	26	28	29	326	83	223	27	26	26
16	26	30	26	26	29	29	286	76	296	27	26	26
17	26	30	26	26	30	29	251	69	363	27	25	26
18	26	28	26	26	26	29	215	65	334	27	26	26
19	26	26	26	27	26	30	187	62	238	26	26	26
20	26	25	26	28	26	30	158	60	186	27	26	26
21	26	25	26	26	26	30	132	54	155	27	26	26
22	26	25	26	26	26	30	121	47	130	27	25	26
23	26	25	26	26	27	30	179	42	109	26	26	26
24	26	25	26	26	28	31	229	46	99	26	26	26
25	31	25	26	26	28	31	239	47	89	26	26	27
26	47	25	26	25	28	31	224	59	76	26	26	27
27	49	25	26	25	28	32	190	66	65	26	26	28
28	50	25	26	26	28	35	170	65	56	26	26	29
29	45	25	26	26	---	41	152	63	112	26	26	29
30	40	25	26	26	---	44	134	61	106	26	28	29
31	37	---	26	28	---	46	---	57	---	26	27	---
TOTAL	1255	814	796	809	749	943	7423	3690	3769	1014	842	796
MEAN	40.5	27.1	25.7	26.1	26.8	30.4	247	119	126	32.7	27.2	26.5
MAX	92	33	26	28	30	46	417	362	363	82	33	29
MIN	26	25	25	25	26	26	51	42	52	26	25	25

CAL YR 1980 TOTAL 15487 MEAN 42.3 MAX 394 MIN 23 MEAN† 59.5 CFSM† 0.81 IN.† 11.05
WTR YR 1981 TOTAL 22900 MEAN 62.7 MAX 417 MIN 25 MEAN† 75.0 CFSM† 1.02 IN.† 13.89

† Adjusted for diversion and change in contents in Greenwood Reservoir.

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI

LOCATION.--Lat 46°23'40", long 87°45'30", in NW¼ SW¼ sec.12, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at former gaging station on left bank 0.5 mi (0.8 km) downstream from County Highway 581, 6 mi (10 km) southwest of Ishpeming, and 10 mi (16 km) east of Republic.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1961 to September 1975, October 1976 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 24, 1961.

REMARKS.--No temperature record Jan. 28 to Mar. 10. Complete ice cover during winter period. Some regulation and diversion 6 mi (10 km) upstream since December 1972.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 23.5°C July 7, 8; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	10.5	10.0	2.5	2.5	.5	.0	.0	.0			---	---
2	10.5	10.0	2.5	2.5	.0	.0	.0	.0			---	---
3	10.0	9.0	3.5	2.5	.0	.0	.0	.0			---	---
4	9.0	8.0	3.5	3.5	.0	.0	.0	.0			---	---
5	8.0	7.0	3.5	2.5	.0	.0	.0	.0			---	---
6	8.0	7.5	3.0	2.0	.0	.0	.0	.0			---	---
7	8.5	7.5	3.0	3.0	.0	.0	.0	.0			---	---
8	9.0	8.5	3.0	1.0	.0	.0	.0	.0			---	---
9	9.0	7.5	1.0	1.0	.0	.0	.0	.0			---	---
10	9.0	8.0	1.0	1.0	.0	.0	.0	.0			---	---
11	9.0	8.0	1.0	1.0	.0	.0	.0	.0			.5	.0
12	8.0	7.0	1.0	1.0	.0	.0	.0	.0			1.0	.5
13	7.0	7.0	1.0	1.0	.0	.0	.0	.0			1.0	1.0
14	7.0	5.5	1.0	1.0	.0	.0	.0	.0			1.0	.5
15	5.5	5.5	1.0	1.0	.0	.0	.0	.0			.5	.5
16	5.5	5.5	1.0	.5	.0	.0	.0	.0			.5	.5
17	7.5	5.5	.5	.5	.0	.0	.0	.0			.5	.5
18	7.5	7.0	.5	.5	.0	.0	.0	.0			.5	.5
19	7.0	6.0	.5	.5	.0	.0	.0	.0			.5	.5
20	6.0	5.5	.5	.5	.0	.0	.0	.0			1.0	.5
21	5.5	5.5	.5	.5	.0	.0	.0	.0			1.5	1.0
22	5.5	4.5	.5	.5	.0	.0	.0	.0			1.5	1.5
23	4.5	4.5	.5	.5	.0	.0	.0	.0			2.5	1.5
24	4.5	4.5	.5	.5	.0	.0	.0	.0			2.5	1.5
25	4.5	4.5	.5	.5	.0	.0	.0	.0			2.5	1.5
26	4.5	3.5	.5	.5	.0	.0	.0	.0			2.5	2.0
27	3.5	3.5	.5	.5	.0	.0	.0	.0			2.5	1.5
28	3.5	3.0	.5	.5	.0	.0	---	---			2.5	1.5
29	3.0	2.5	.5	.5	.0	.0	---	---			2.5	1.5
30	2.5	2.5	.5	.5	.0	.0	---	---			1.5	1.5
31	2.5	2.5	---	---	.0	.0	---	---			1.5	1.5
MONTH	10.5	2.5	3.5	.5	.5	.0	.0	.0				

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.5	8.5	7.0	15.5	13.5	19.0	18.0	20.0	18.5	18.5	17.5
2	1.5	1.0	8.5	7.5	14.5	13.5	20.0	18.5	20.0	18.0	17.5	16.0
3	1.5	1.5	7.5	7.5	15.5	14.5	20.0	19.0	20.0	19.0	16.5	14.5
4	1.5	1.0	7.5	7.5	17.5	14.5	21.0	20.0	20.5	19.5	16.5	16.0
5	1.5	1.0	8.5	7.5	18.0	16.0	22.0	19.0	20.5	19.0	16.0	15.0
6	2.5	1.0	9.5	7.5	18.0	16.0	23.0	20.0	20.5	19.0	16.0	15.0
7	2.5	2.5	9.5	8.0	18.0	15.5	23.5	21.0	19.0	18.0	16.0	16.0
8	2.5	2.5	9.5	9.5	16.0	15.0	23.5	21.0	18.0	17.0	16.0	14.5
9	3.5	2.0	9.5	8.5	16.0	15.0	22.5	20.5	18.0	17.5	15.0	13.0
10	4.0	3.5	8.5	7.5	17.5	16.0	22.5	18.5	17.5	17.0	17.0	15.0
11	4.0	4.0	8.5	7.5	17.5	16.0	21.5	19.5	17.0	16.5	17.0	16.0
12	4.0	4.0	10.0	8.0	18.5	16.5	21.5	20.5	18.0	17.0	16.5	15.0
13	4.0	4.0	10.5	9.0	18.5	18.0	22.0	19.5	19.0	18.0	17.0	15.5
14	4.0	4.0	12.0	10.0	18.5	17.5	21.5	18.5	19.0	19.0	17.0	16.0
15	5.0	3.0	12.0	10.0	19.5	18.5	18.5	16.0	19.0	18.0	16.0	14.5
16	6.0	5.0	12.0	10.5	19.5	18.5	17.5	17.5	18.0	16.5	14.5	13.0
17	7.0	5.5	12.0	10.0	18.5	17.0	18.5	17.0	17.5	15.0	13.5	12.5
18	7.0	5.5	12.0	9.5	18.5	18.5	19.5	17.5	17.0	15.5	12.5	12.0
19	7.0	6.0	13.0	10.0	18.5	18.5	20.5	18.5	17.0	16.0	12.5	12.0
20	6.0	5.0	13.5	11.0	18.5	17.5	20.5	18.0	18.0	16.0	12.5	12.0
21	6.0	4.5	15.0	12.0	17.5	16.5	18.5	16.5	18.0	16.5	12.5	11.5
22	5.0	5.0	15.0	13.0	17.5	17.0	18.0	15.5	18.0	17.0	11.5	10.0
23	5.0	5.0	15.0	14.0	17.5	16.5	18.0	15.5	19.0	17.5	10.5	10.0
24	5.5	5.0	15.0	14.0	17.5	17.0	18.5	17.5	19.5	18.0	11.5	10.5
25	6.5	5.5	14.5	14.0	18.5	17.0	18.5	18.0	19.0	17.0	11.5	11.5
26	6.5	6.0	14.0	13.5	19.0	17.0	18.5	16.5	17.0	17.0	12.0	11.5
27	6.5	6.5	14.0	13.0	19.0	17.0	17.0	14.5	17.5	17.0	12.0	11.0
28	6.5	6.5	14.5	12.5	19.0	18.0	17.0	15.5	17.5	16.0	11.0	10.0
29	8.0	6.5	15.5	14.5	18.5	18.0	17.5	15.0	18.0	17.5	10.0	9.5
30	8.0	7.5	15.5	13.5	19.0	18.0	17.5	16.0	18.0	18.0	9.5	9.0
31	---	---	15.5	12.5	---	---	20.0	17.0	18.5	18.0	---	---
MONTH	8.0	1.0	15.5	7.0	19.5	13.5	23.5	14.5	20.5	15.0	18.5	9.0

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI

LOCATION.--Lat 46°19'02", long 87°30'07", in NW¼ sec.12, T.45 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 400 ft (122 m) downstream from powerplant, 0.3 mi (0.5 km) upstream from Green Creek, and 2.2 mi (3.5 km) northwest of Princeton.

DRAINAGE AREA.--210 mi^2 (544 km^2).

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,100 ft (335 m) from topographic map (nearest 20 ft).

REMARKS.--Records good. Flow regulated by powerplant above station. Since December 1972, additional regulation 27 mi (43 km) upstream (station 04057814). Since January 1973, flow diverted to Green Creek 27 mi (43 km) upstream (station 04057813) by industry for iron ore processing, some returned 0.3 mi (0.5 km) downstream via another Green Creek (station 04058130). Since October 1979 some of diversion returned 5 mi (8 km) downstream via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 223 ft^3/s (6.315 m^3/s), 14.42 in/yr (366 mm/yr), adjusted for storage and diversion since December 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,580 ft^3/s (73.1 m^3/s) May 6, 1972, gage height, 7.85 ft (2.393 m); maximum gage height, 8.37 ft (2.551 m) Apr. 27, 1979; minimum discharge recorded, 2.2 ft^3/s (0.062 m^3/s) Oct. 5, 1964; minimum daily, 4.1 ft^3/s (0.12 m^3/s) Feb. 4, 1967.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 25 and 26, 1960, reached a stage 10.5 ft (3.20 m) from floodmark, discharge, 3,850 ft^3/s (109 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 945 ft^3/s (26.8 m^3/s) May 7, gage height, 4.52 ft (1.378); minimum, 21 ft^3/s (0.59 m^3/s) Oct. 17, 18, gage height, 0.91 ft (0.277 m); minimum daily, 22 ft^3/s (0.62 m^3/s) Oct. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	358	182	95	101	99	146	394	404	195	455	89	97
2	280	182	97	99	99	146	392	389	182	386	89	97
3	212	168	97	101	99	146	443	387	202	254	92	97
4	215	140	95	101	99	146	634	413	230	196	115	97
5	215	130	107	101	99	135	811	697	228	196	222	99
6	210	130	122	101	97	119	872	865	228	195	241	99
7	225	130	122	101	89	120	853	930	228	180	335	99
8	210	130	122	101	87	120	816	853	228	158	414	99
9	180	130	122	101	87	120	752	719	225	151	406	110
10	158	130	125	101	88	120	717	595	225	138	340	118
11	155	130	112	101	90	120	725	495	225	131	451	97
12	155	132	97	101	93	120	743	428	225	130	440	91
13	130	132	99	101	93	120	776	398	225	122	327	91
14	105	132	99	95	94	120	776	349	255	110	283	97
15	105	135	99	80	94	120	718	315	575	109	278	97
16	125	142	99	78	87	114	641	313	653	108	274	108
17	101	220	99	78	98	106	581	311	731	102	205	118
18	22	228	99	78	102	107	518	193	734	93	131	118
19	84	179	99	78	99	106	465	167	626	93	117	115
20	128	151	99	76	97	108	422	167	503	93	117	115
21	245	151	101	76	97	108	382	167	449	93	117	105
22	262	151	99	76	97	108	376	167	419	111	117	97
23	128	151	99	76	99	97	406	167	348	111	117	97
24	105	140	99	76	140	93	605	168	332	92	104	97
25	127	128	99	76	156	97	687	168	335	87	97	95
26	133	108	99	77	156	99	679	148	309	87	97	95
27	210	95	99	77	151	139	611	200	335	87	97	95
28	302	95	99	87	146	160	545	230	331	87	97	95
29	258	95	99	105	---	186	489	212	217	87	97	95
30	255	95	99	103	---	398	442	225	191	87	97	95
31	215	---	101	99	---	398	---	225	---	87	97	---
TOTAL	5613	4242	3198	2802	2932	4342	18271	11465	10189	4416	6100	3025
MEAN	181	141	103	90.4	105	140	609	370	340	142	197	101
MAX	358	228	125	105	156	398	872	930	734	455	451	118
MIN	22	95	95	76	87	93	376	148	182	87	89	91

CAL YR 1980 TOTAL 62944 MEAN 172 MAX 690 MIN 22 MEAN+ 189 CFSM+ 0.90 IN+ 12.26
WTR YR 1981 TOTAL 76595 MEAN 210 MAX 930 MIN 22 MEAN+ 222 CFSM+ 1.06 IN+ 14.36

+ Adjusted for diversion and change in contents in Greenwood Reservoir.

04058130 GREEN CREEK NEAR PRINCETON, MI

LOCATION.--Lat 46°20'02", long 87°31'58", in SW¼ SW¼ sec.35, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 100 ft (30 m) downstream from bridge on State Highway 35, 3.0 mi (4.8 km) upstream from mouth, 4.0 mi (6.4 km) northwest of Princeton.

DRAINAGE AREA.--13.8 mi² (35.7 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-65, 1971. October 1976 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,165.74 ft (355.318 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 14, 1977, nonrecording gage at bridge 100 ft (30 m) upstream at datum 0.97 ft (0.296 m) higher.

REMARKS.--Water-discharge records fair. Since October 1964, flow affected by regulation from industrial tailings pond in headwaters and some diversion into basin from Schweitzer Reservoir (station 04058190).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 166 ft³/s (4.70 m³/s) Sept. 12, 1978, gage height, 5.75 ft (1.753 m); maximum gage height, 7.23 ft (2.204 m) Mar. 27, 1979, backwater from ice; minimum discharge observed, 2.84 ft³/s (0.080 m³/s) Oct. 1, 1963, discharge measurement; minimum daily, 6.0 ft³/s (0.17 m³/s) Dec. 27-29, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 67 ft³/s (1.90 m³/s) May 5, gage height, 4.91 ft (1.497 m); maximum gage height, 5.41 ft (1.649 m) Feb. 1, backwater from ice; minimum daily discharge, 6.0 ft³/s (0.17 m³/s) Dec. 27-29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	12	19	11	46	19	33	27	16	25	11	20
2	28	10	21	8.8	44	18	35	26	16	23	18	18
3	28	10	24	7.5	43	17	37	30	26	22	13	17
4	27	10	33	7.2	42	17	48	48	33	21	21	17
5	25	9.5	50	7.0	40	16	45	64	23	21	19	17
6	23	9.1	52	6.8	35	15	40	59	19	20	18	17
7	22	9.4	38	6.8	32	15	39	52	15	19	22	18
8	23	9.0	29	6.8	28	14	42	48	15	19	23	20
9	22	11	27	6.8	25	13	38	44	16	22	22	18
10	22	10	25	6.8	22	13	37	44	15	20	34	17
11	23	9.3	24	6.8	20	12	35	44	13	20	37	19
12	23	9.6	23	6.8	15	12	31	43	22	18	32	22
13	23	13	22	6.8	14	11	29	42	21	17	28	19
14	22	13	20	6.8	14	10	32	41	47	15	27	20
15	22	12	19	6.8	13	9.5	25	44	48	15	25	19
16	20	13	18	6.8	15	9.0	24	44	39	15	22	19
17	13	11	16	7.0	23	8.4	24	39	31	15	20	19
18	11	11	14	7.0	43	8.2	23	37	27	15	21	18
19	8.8	13	13	7.2	44	8.4	23	36	25	14	22	17
20	8.1	13	11	7.5	45	8.6	22	33	29	14	22	16
21	8.3	13	10	7.8	43	9.0	22	22	30	15	21	15
22	8.0	14	8.5	8.0	30	10	23	22	26	14	20	15
23	7.9	15	7.5	8.2	25	11	48	22	25	13	20	16
24	8.7	16	7.0	8.7	26	13	55	20	29	13	19	15
25	15	17	6.5	9.3	27	15	49	17	30	14	19	14
26	13	18	6.2	13	26	17	46	22	25	13	22	13
27	12	19	6.0	20	24	19	39	19	24	8.0	21	13
28	13	19	6.0	30	21	21	36	18	22	7.7	20	12
29	13	19	6.0	45	---	24	31	18	27	7.2	21	12
30	13	18	6.5	47	---	27	28	21	26	7.3	20	12
31	13	---	8.0	48	---	30	---	17	---	7.2	20	---
TOTAL	548.8	385.9	576.2	390.0	825	450.1	1039	1063	760	489.4	680	504
MEAN	17.7	12.9	18.6	12.6	29.5	14.5	34.6	34.3	25.3	15.8	21.9	16.8
MAX	30	19	52	48	46	30	55	64	48	25	37	22
MIN	7.9	9.0	6.0	6.8	13	8.2	22	17	13	7.2	11	12

CAL YR 1980 TOTAL 7419.8 MEAN 20.3 MAX 100 MIN 4.3
WTR YR 1981 TOTAL 7711.4 MEAN 21.1 MAX 64 MIN 6.0

04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961-64, 1971, 1977 to September 1981 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1977 to September 1981.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum recorded, 26.0°C July 7, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C July 7; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	12.5	11.0	12.0	2.5	2.0	2.0	.0	.0	.0	.0	.0	.0
2	11.5	8.5	10.0	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
3	8.5	7.0	7.5	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
4	7.0	6.5	6.5	4.0	2.5	3.5	.0	.0	.0	.0	.0	.0
5	7.0	5.5	6.5	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
6	9.0	7.0	8.0	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
7	9.0	6.5	8.0	3.5	2.0	2.5	.5	.0	.0	.0	.0	.0
8	9.5	7.5	8.5	2.0	.0	.5	.5	.0	.5	.0	.0	.0
9	8.5	6.5	7.5	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
10	9.5	7.0	8.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
11	9.0	7.0	8.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
12	7.0	6.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	6.5	5.5	5.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
14	6.5	5.0	5.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
15	6.5	4.5	5.5	.5	.0	.5	.0	.0	.0	.0	.0	.0
16	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	9.0	6.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	8.5	6.5	7.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
19	6.5	5.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	5.0	4.0	4.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
22	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	5.0	3.5	4.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
24	5.5	5.0	5.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
25	5.5	4.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	4.0	2.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	2.5	1.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	2.0	.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	2.0	.5	1.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
31	2.5	1.0	2.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	12.5	.5	5.5	4.0	.0	.5	.5	.0	.0	.0	.0	.0

04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	2.0	1.5	1.5	10.5	5.0	7.5
2	.0	.0	.0	.0	.0	.0	4.5	.5	2.5	8.5	6.0	7.5
3	.0	.0	.0	.0	.0	.0	4.0	2.0	3.0	8.0	7.0	7.0
4	.0	.0	.0	.0	.0	.0	3.5	.0	1.0	8.0	7.0	7.5
5	.0	.0	.0	.0	.0	.0	3.0	.0	1.0	10.0	6.5	8.0
6	.0	.0	.0	---	---	---	4.5	.0	2.5	10.5	5.0	8.0
7	.0	.0	.0	---	---	---	4.0	3.0	3.5	12.0	6.5	9.5
8	.0	.0	.0	---	---	---	4.0	3.0	3.5	11.0	8.0	10.0
9	.0	.0	.0	---	---	---	6.0	1.5	4.0	10.5	6.5	8.5
10	.0	.0	.0	.0	.0	.0	8.0	4.5	6.0	9.0	4.5	7.0
11	.0	.0	.0	.0	.0	.0	7.0	5.5	6.5	9.5	6.0	7.5
12	.0	.0	.0	.0	.0	.0	8.0	4.5	6.0	12.0	6.0	9.0
13	.0	.0	.0	.0	.0	.0	7.0	6.0	6.5	12.0	7.5	10.0
14	.0	.0	.0	.0	.0	.0	6.5	4.0	5.5	13.5	8.0	10.5
15	.0	.0	.0	.0	.0	.0	7.0	1.5	4.0	14.5	9.0	12.0
16	.0	.0	.0	.0	.0	.0	9.0	4.5	7.0	14.0	10.0	12.0
17	.0	.0	.0	.0	.0	.0	11.0	8.0	9.0	13.5	8.5	11.0
18	.0	.0	.0	.0	.0	.0	10.0	6.0	8.0	13.5	8.0	11.0
19	.0	.0	.0	.0	.0	.0	7.5	5.5	7.0	15.0	9.0	12.0
20	.0	.0	.0	.0	.0	.0	7.5	3.5	5.5	15.5	11.0	13.0
21	.0	.0	.0	.0	.0	.0	6.5	3.0	5.0	18.0	12.0	14.5
22	.0	.0	.0	.0	.0	.0	5.5	5.0	5.0	17.5	12.5	15.0
23	.0	.0	.0	.0	.0	.0	5.5	2.0	4.0	17.0	14.0	15.5
24	.0	.0	.0	.0	.0	.0	4.5	1.5	3.0	16.0	14.0	15.0
25	.0	.0	.0	.0	.0	.0	6.5	2.0	4.5	15.5	14.0	14.5
26	.0	.0	.0	.0	.0	.0	6.5	4.0	5.0	14.0	12.0	13.0
27	.0	.0	.0	2.5	.0	1.0	6.5	4.5	5.5	14.5	10.5	12.0
28	.0	.0	.0	3.0	1.0	1.5	6.5	6.0	6.5	15.5	10.0	13.0
29	---	---	---	1.5	1.0	1.5	10.0	4.5	7.0	17.5	13.0	15.0
30	---	---	---	1.0	.5	1.0	8.5	6.5	7.5	15.5	12.5	14.0
31	---	---	---	2.5	.5	1.5	---	---	---	16.0	9.0	13.0
MONTH	.0	.0	.0				11.0	.0	5.0	18.0	4.5	11.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.5	12.0	12.5	20.5	15.0	17.5	20.5	18.5	19.5	19.5	17.0	18.5
2	15.0	11.0	13.0	21.0	16.5	18.5	21.0	17.5	19.0	16.5	15.0	15.5
3	15.5	13.5	14.5	21.0	17.5	19.5	21.5	18.5	20.0	17.0	12.5	14.5
4	19.5	13.0	16.0	22.0	18.5	20.0	22.0	18.5	20.0	15.5	14.5	15.0
5	19.0	15.0	17.0	23.5	17.5	20.5	21.5	17.5	19.5	14.5	14.0	14.0
6	19.0	14.5	16.5	24.5	18.0	21.5	19.5	17.5	18.5	16.0	13.5	14.5
7	16.0	12.5	14.0	26.0	20.5	23.0	18.5	17.0	17.5	15.5	14.5	15.0
8	15.0	12.5	13.5	25.5	21.0	23.5	21.0	16.5	18.5	14.5	12.5	13.5
9	15.5	12.0	14.0	25.0	22.0	23.5	19.5	17.0	18.0	15.0	10.5	12.5
10	17.5	13.0	15.0	24.0	18.5	21.5	17.5	16.0	17.0	17.0	13.5	15.5
11	17.0	13.0	15.0	24.0	20.0	22.0	18.5	14.5	16.5	17.0	15.5	16.0
12	19.5	14.5	17.0	24.0	21.0	22.5	20.5	16.5	18.5	17.0	14.0	15.5
13	18.5	16.0	17.5	24.5	20.0	22.0	21.0	18.5	19.5	18.0	14.0	16.0
14	17.5	16.5	17.0	21.0	18.0	19.5	21.0	20.0	20.5	17.0	15.0	16.0
15	20.0	17.5	18.0	19.5	15.0	17.5	20.5	17.5	19.0	15.0	13.0	14.0
16	19.5	16.5	18.0	18.5	17.0	18.0	19.0	15.5	17.0	13.0	12.0	12.5
17	19.0	14.0	16.5	20.0	17.0	18.5	18.0	14.0	16.0	13.0	11.0	12.0
18	20.5	17.0	18.0	21.0	17.0	19.0	17.5	14.5	16.0	12.5	10.0	11.5
19	20.5	15.5	17.0	22.5	17.5	20.0	18.5	15.0	17.0	13.0	11.0	12.0
20	18.0	15.0	16.5	20.5	17.0	18.5	19.5	15.0	17.0	12.0	10.0	11.0
21	17.0	14.0	15.0	19.0	15.0	17.0	20.0	15.5	17.5	11.0	9.5	10.0
22	18.0	14.5	16.0	18.0	13.5	16.0	19.5	16.5	17.5	11.0	8.5	9.5
23	17.0	13.0	15.0	19.0	14.0	16.5	21.0	17.5	19.0	11.0	7.5	9.0
24	17.5	15.0	16.5	20.5	16.0	18.0	21.0	18.0	19.5	12.5	10.0	11.0
25	17.5	15.0	16.0	20.0	17.5	18.5	18.0	16.0	17.0	12.5	11.5	12.0
26	19.0	14.0	16.5	17.5	14.5	16.0	18.0	17.0	17.5	13.0	12.0	12.5
27	18.0	14.5	16.0	16.5	12.5	15.0	17.5	16.5	17.0	13.0	10.0	11.5
28	19.5	15.0	17.5	17.0	14.0	15.5	18.0	15.5	16.5	10.0	8.0	9.5
29	19.5	16.5	18.0	16.5	12.5	15.0	18.5	17.5	18.0	10.0	9.0	9.5
30	20.5	16.0	18.0	17.5	13.5	16.0	19.5	18.0	18.5	9.5	8.5	8.5
31	---	---	---	21.0	16.0	18.5	20.5	18.0	19.0	---	---	---
MONTH	20.5	11.0	16.0	26.0	12.5	19.0	22.0	14.0	18.0	19.5	7.5	13.0

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE¼ NW¼ sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft (36 m) upstream from dam on Schweitzer Creek, and 3.0 mi (4.8 km) southwest of Palmer.

DRAINAGE AREA.--23.1 mi^2 (59.8 km^2).

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft (396.240 m) Cleveland-Cliffs Iron Co. datum; gage readings have been reduced to elevations NGVD. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft (6.53 hm^3) at spillway elevation 1,338.00 ft (407.822 m). The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 2.3 ft^3/s (0.065 m^3/s) was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 37 ft^3/s (1.05 m^3/s) was diverted from reservoir for iron ore processing, some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 26.9 ft^3/s (0.76 m^3/s) for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft (7.27 hm^3) May 31, 1970, elevation, 1,339.5 ft (408.28 m); minimum recorded since first filling, 2,920 acre-ft (3.60 hm^3) Apr. 10, 1974, elevation, 1,329.7 ft (405.29 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,500 acre-ft (6.78 hm^3) May 5, elevation, 1,338.5 ft (407.97 m); minimum, 4,470 acre-ft (5.51 hm^3) Oct. 16, elevation, 1,335.4 ft (407.03 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	1337.6	5160	--	--
Oct. 31	1336.2	4710	-450	-7.3
Nov. 30	1338.0	5300	+590	+9.9
Dec. 31	1337.3	5060	-240	-3.9
CAL YR 1980	--	--	+410	+0.6
Jan. 31	1336.4	4770	-290	-4.7
Feb. 28	1337.4	5090	+320	+5.8
Mar. 31	1338.3	5420	+330	+5.4
Apr. 30	1338.0	5300	-120	-2.0
May 31	1336.0	4650	-650	-10.6
June 30	1338.2	5380	+730	+12.3
July 31	1336.3	4740	-640	-10.4
Aug. 31	1337.0	4950	+210	+3.4
Sept. 30	1337.0	4950	0	0
WTR YR 1981	--	--	-210	-0.3

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW¼ sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) upstream from highway bridge, and 2.5 mi (4.0 km) southwest of Palmer.

DRAINAGE AREA.--23.6 mi² (61.1 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft (387 m) from topographic map (nearest 10 ft). Prior to Aug. 21, 1861, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period, which are fair. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi (1.6 km) upstream. An average of 2.3 ft³/s (0.065 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 37 ft³/s (1.05 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek (station 04058130) and some returned via Goose Lake Outlet (station 04058400) and East Branch Escanaba River. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) May 31, 1970, gage height, 6.50 ft (1.981 m); minimum, 0.4 ft³/s (0.011 m³/s) Sept. 6, 1962, gage height, 1.22 ft (0.372 m); minimum daily, 1.0 ft ³/s (0.028 m³/s) Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 117 ft³/s (3.31 m³/s) Apr. 4, May 5, gage height, 4.07 ft (1.241 m); minimum daily, 5.5 ft³/s (0.16 m³/s) Jan. 7, 10, 11, 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.0	5.9	6.2	5.9	5.7	5.9	75	7.4	6.4	35	7.6	5.9
2	6.0	5.9	6.2	5.8	5.7	5.9	66	6.6	6.4	22	6.2	5.8
3	6.1	5.9	6.2	5.8	5.7	5.8	72	8.1	7.2	11	6.1	5.8
4	5.9	5.9	6.2	5.8	5.7	5.9	104	37	6.6	7.1	6.2	5.8
5	6.0	5.9	6.2	5.7	5.7	5.8	91	105	6.4	6.9	5.9	5.9
6	5.9	5.9	6.4	5.6	5.7	5.9	57	82	6.3	6.6	6.2	5.8
7	5.9	5.9	6.4	5.5	5.7	5.9	44	41	6.4	6.3	6.3	6.4
8	5.9	6.0	6.4	5.6	5.7	5.9	44	19	6.5	6.2	6.0	6.0
9	5.9	6.1	6.4	5.6	5.7	5.9	36	10	6.4	6.3	7.0	5.9
10	5.9	5.9	6.2	5.5	5.7	5.9	35	7.4	6.3	6.1	7.2	5.8
11	5.9	5.9	6.2	5.5	5.6	5.9	46	6.9	6.4	6.1	6.5	5.9
12	5.9	6.1	6.2	5.6	5.6	5.9	35	6.9	6.3	6.2	6.2	5.8
13	5.9	6.3	6.2	5.6	5.6	5.9	23	6.8	6.5	6.1	6.2	5.7
14	5.9	6.1	6.0	5.6	5.6	5.8	19	6.7	8.2	6.1	6.8	5.8
15	5.9	6.0	5.9	5.7	5.6	5.9	17	6.6	7.1	6.1	7.0	5.8
16	5.9	5.9	5.9	5.7	5.7	5.8	13	6.6	6.8	6.3	6.2	5.8
17	6.0	5.9	6.0	5.6	5.7	5.9	12	6.6	6.6	6.6	6.0	5.8
18	5.9	6.0	5.8	5.6	5.8	5.9	10	6.5	6.6	6.1	6.0	5.8
19	5.9	6.1	5.8	5.6	5.8	5.9	8.7	6.4	6.5	6.1	6.0	5.7
20	5.9	6.1	5.8	5.6	5.7	5.9	7.4	6.4	6.9	6.3	6.0	5.7
21	5.9	6.1	5.8	5.6	5.7	5.9	7.1	6.4	6.8	6.1	5.9	5.8
22	5.9	6.2	5.8	5.6	6.0	5.9	7.3	6.4	10	6.0	6.0	5.8
23	5.9	6.2	5.7	5.6	6.3	6.0	18	6.4	8.3	6.0	6.0	5.7
24	6.2	6.2	5.6	5.6	6.1	6.2	76	6.6	7.4	5.9	5.9	5.7
25	6.3	6.2	5.6	5.6	6.0	6.4	54	6.5	8.2	6.1	6.0	5.8
26	5.9	6.2	5.6	5.6	5.9	6.3	32	6.8	6.6	6.0	6.2	5.8
27	5.9	6.2	5.7	5.6	5.9	6.5	21	6.6	6.4	5.9	6.0	5.7
28	5.9	6.2	5.8	5.5	6.0	7.0	18	6.4	6.5	5.9	5.9	5.7
29	5.9	6.2	5.9	5.5	---	7.5	15	6.6	9.5	5.9	6.1	5.7
30	5.9	6.2	5.9	5.6	---	20	10	6.4	41	5.8	6.0	5.9
31	5.9	---	5.9	5.7	---	58	---	6.3	---	5.8	5.9	---
TOTAL	184.2	181.6	185.9	174.4	161.6	253.3	1073.5	461.3	243.5	240.9	193.5	174.5
MEAN	5.94	6.05	6.00	5.63	5.77	8.17	35.8	14.9	8.12	7.77	6.24	5.82
MAX	6.3	6.3	6.4	5.9	6.3	58	104	105	41	35	7.6	6.4
MIN	5.9	5.9	5.6	5.5	5.6	5.8	7.1	6.3	6.3	5.8	5.9	5.7

CAL YR 1980 TOTAL 2891.3 MEAN 7.90 MAX 78 MIN 5.5
WTR YR 1981 TOTAL 3528.2 MEAN 9.67 MAX 105 MIN 5.5

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI

LOCATION.--Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank 0.8 mi (1.3 km) upstream from mouth, and 3 mi (5 km) west of Sands Station.

DRAINAGE AREA.--37.5 mi^2 (97.1 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,160 ft (354 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good except those for period of indefinite stage-discharge relation, Aug. 20 to Sept. 25, which are fair. Flow includes an average of 13 ft^3/s (0.37 m^3/s) discharged into basin from mine tailings pond 3 mi (5 km) upstream, the greater part diverted from Schweitzer Reservoir (station 04058190). Diversion began October 1979.

AVERAGE DISCHARGE.--10 years (water years 1966-75), 32.8 ft^3/s (0.929 m^3/s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 458 ft^3/s (13.0 m^3/s) May 31, 1970, gage height, 5.89 ft (1.795 m); minimum, 3.7 ft^3/s (0.10 m^3/s) Oct. 10, 1976, Jan. 22, Feb. 14 and part or all of each day Feb. 16-23, Feb. 26 to Mar. 8, 1977, gage height, 1.35 ft (0.411 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 137 ft^3/s (3.88 m^3/s) Apr. 4, gage height, 3.92 ft (1.195 m); minimum daily, 12 ft^3/s (0.34 m^3/s) Sept. 15, 16, 21-30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	35	30	30	29	43	110	69	44	33	16	13
2	39	35	27	33	29	44	112	67	44	31	19	13
3	39	34	26	31	30	45	118	72	52	30	20	13
4	36	33	33	31	30	46	132	89	53	28	25	14
5	35	29	34	31	29	45	131	119	51	26	18	14
6	34	18	33	31	28	45	123	124	49	24	18	14
7	34	18	34	29	28	44	117	113	46	22	19	14
8	34	17	36	29	28	45	114	103	50	21	18	19
9	33	21	34	28	28	44	108	94	46	20	22	21
10	33	20	32	28	28	40	105	87	43	19	28	16
11	34	20	32	28	28	39	103	80	42	18	30	15
12	36	20	33	28	28	40	98	74	41	17	30	14
13	35	25	33	28	28	39	92	72	39	16	28	13
14	34	28	32	27	28	38	90	69	56	15	26	13
15	33	28	32	27	28	40	82	66	60	15	20	12
16	40	23	33	28	28	39	77	63	58	15	23	12
17	31	26	33	28	28	37	73	60	46	15	21	13
18	34	28	31	28	30	36	69	58	42	15	15	15
19	30	39	32	28	30	37	64	56	38	15	13	19
20	29	40	32	28	30	37	60	54	40	14	13	15
21	29	43	33	28	31	37	62	52	40	16	13	12
22	29	42	33	28	32	37	62	51	37	16	13	12
23	29	44	32	28	35	39	85	51	35	15	13	12
24	31	43	31	28	35	42	101	51	35	15	13	12
25	41	40	31	28	35	46	96	49	33	16	13	12
26	41	39	30	29	35	48	89	52	30	14	13	12
27	40	37	29	28	36	53	83	50	28	13	13	12
28	39	36	29	28	40	59	81	49	27	13	14	12
29	37	35	29	28	---	71	76	50	35	13	14	12
30	36	33	29	28	---	92	73	47	35	13	14	12
31	34	---	28	28	---	101	---	45	---	13	14	---
TOTAL	1079	929	976	888	852	1448	2786	2136	1275	566	569	412
MEAN	34.8	31.0	31.5	28.6	30.4	46.7	92.9	68.9	42.5	18.3	18.4	13.7
MAX	41	44	36	33	40	101	132	124	60	33	30	21
MIN	29	17	26	27	28	36	60	45	27	13	13	12

CAL YR 1980 TOTAL 12079.7 MEAN 33.0 MAX 172 MIN 7.1
WTR YR 1981 TOTAL 13916.0 MEAN 38.1 MAX 132 MIN 12

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972 to September 1981 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1976 to September 1981.

INSTRUMENTATION.--Water-quality monitor since November 1976.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0ºC July 19, 1977; minimum, 0.0ºC on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.5ºC July 7, 8; minimum, 0.0ºC on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	12.0	11.0	11.5	4.0	3.0	3.5	1.5	.5	1.0	1.5	.0	1.0
2	11.0	8.5	9.5	4.0	2.5	3.0	.5	.0	.0	.0	.0	.0
3	8.5	7.0	7.5	5.0	3.5	4.0	.5	.0	.0	.0	.0	.0
4	7.0	6.5	7.0	5.0	4.0	4.5	1.0	.0	.5	.0	.0	.0
5	8.5	6.0	7.0	4.0	3.0	3.5	1.5	1.0	1.0	.0	.0	.0
6	9.5	7.0	8.0	5.0	3.0	4.0	2.0	1.5	2.0	.0	.0	.0
7	10.0	6.5	8.0	4.5	3.0	4.0	2.0	2.0	2.0	.0	.0	.0
8	10.0	7.5	9.0	2.5	1.0	2.0	1.5	.5	1.5	.0	.0	.0
9	9.0	6.5	8.0	3.0	2.0	2.5	1.0	.0	1.0	.0	.0	.0
10	9.5	7.5	8.5	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
11	9.0	7.0	8.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
12	7.5	6.0	6.5	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
13	7.0	5.5	6.5	2.5	2.0	2.5	.0	.0	.0	.5	.0	.0
14	7.5	5.5	6.5	2.0	1.5	2.0	.0	.0	.0	1.5	.5	1.0
15	7.5	5.5	6.5	1.5	.5	1.5	.0	.0	.0	1.5	.0	1.0
16	7.5	5.0	6.5	2.0	.0	1.0	.0	.0	.0	.5	.0	.0
17	9.5	7.0	8.5	2.0	1.0	1.5	.0	.0	.0	1.0	.0	.5
18	8.0	7.0	7.5	2.0	1.0	1.0	.0	.0	.0	2.0	.5	1.0
19	7.0	5.5	6.0	2.5	.5	1.0	.0	.0	.0	2.0	.0	1.0
20	6.5	5.5	6.0	2.5	.5	1.5	.0	.0	.0	2.0	.5	1.5
21	6.0	5.0	5.5	2.5	1.0	2.0	.0	.0	.0	2.5	1.0	1.5
22	5.5	4.5	5.0	2.5	.5	1.5	.0	.0	.0	2.0	1.5	1.5
23	6.5	4.5	5.5	2.5	1.5	2.0	.0	.0	.0	3.0	1.0	1.5
24	7.0	5.5	6.0	1.5	1.0	1.0	.0	.0	.0	2.5	.0	1.5
25	6.5	4.5	5.5	1.0	.0	.5	.0	.0	.0	3.0	1.5	2.0
26	4.5	3.0	3.5	1.5	.0	.5	.0	.0	.0	2.0	1.0	2.0
27	4.0	3.0	3.5	1.5	.0	.5	.0	.0	.0	1.5	.0	.5
28	3.5	2.0	3.0	1.5	1.0	1.5	1.0	.0	.5	1.0	.0	.0
29	4.0	2.0	3.0	1.5	1.0	1.0	1.0	.5	1.0	1.0	.0	.5
30	4.0	2.0	3.0	2.0	1.0	1.5	.5	.5	.5	1.0	.0	.0
31	4.5	2.5	3.5	---	---	---	1.0	.5	.5	1.5	.0	.5
MONTH	12.0	2.0	6.5	5.0	.0	2.0	2.0	.0	.5	3.0	.0	.5

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.5	.0	1.0	2.5	1.0	1.5	3.0	1.5	2.0	9.5	5.0	7.5
2	.0	.0	.0	1.5	.0	.5	5.0	.0	2.5	8.0	5.5	7.0
3	.0	.0	.0	2.5	.0	1.0	4.5	1.5	3.0	7.5	7.0	7.0
4	.0	.0	.0	2.0	.0	1.0	3.0	.5	1.5	8.0	7.5	7.5
5	.0	.0	.0	2.0	.0	.5	3.0	.0	1.0	9.5	7.0	8.0
6	1.5	.0	.5	2.0	.0	.5	5.0	.0	2.5	10.5	5.5	8.0
7	1.0	.5	.5	3.0	.0	1.5	4.0	3.0	3.5	11.5	6.5	9.0
8	.5	.0	.0	3.0	1.0	2.0	4.0	3.5	3.5	11.0	8.0	9.5
9	.5	.0	.0	3.0	.5	1.5	6.5	2.5	4.5	9.5	6.0	8.0
10	.0	.0	.0	2.5	1.0	1.5	8.5	4.5	6.5	8.0	4.0	6.0
11	.0	.0	.0	3.5	.5	2.0	8.0	5.5	6.5	9.0	5.5	7.5
12	.0	.0	.0	4.0	.5	2.0	8.0	4.0	6.0	11.0	6.5	8.5
13	.0	.0	.0	2.5	.0	1.0	7.5	6.0	6.5	11.0	7.0	9.0
14	1.0	.0	.5	4.5	.0	1.5	6.5	4.0	5.0	12.5	7.5	10.0
15	3.0	1.0	1.5	2.0	.0	1.5	7.0	2.5	4.5	13.0	8.5	11.0
16	3.5	1.5	2.5	3.0	.0	1.0	9.5	4.5	7.0	12.0	9.5	10.5
17	4.0	1.5	2.5	3.0	.0	1.0	10.5	7.5	9.0	12.0	7.5	9.5
18	3.0	2.5	3.0	2.0	.0	.5	9.5	6.0	8.0	12.5	7.5	9.5
19	4.0	1.5	2.5	2.0	.0	1.0	7.5	5.5	6.5	13.5	8.5	10.5
20	3.0	2.0	2.5	2.5	.5	1.5	7.5	3.5	5.5	13.5	9.5	12.0
21	4.0	1.0	2.5	4.5	1.0	2.5	6.5	3.5	5.0	16.0	11.0	13.5
22	3.0	2.0	2.5	5.0	.5	2.5	6.0	5.0	5.5	15.5	11.5	13.5
23	3.0	2.5	3.0	5.5	1.0	3.0	5.5	3.0	4.5	14.5	12.0	13.5
24	3.0	1.5	2.5	6.0	1.0	3.0	4.5	2.5	3.5	14.5	12.0	13.0
25	2.0	1.5	1.5	6.0	.5	3.0	6.5	3.0	4.5	14.0	12.5	13.0
26	3.0	1.0	1.5	3.5	2.5	3.0	6.5	4.0	5.0	12.5	11.5	12.5
27	3.0	1.0	2.0	6.0	1.0	3.0	6.5	4.5	6.0	14.5	11.0	12.5
28	3.0	1.5	2.0	5.5	2.5	3.5	7.0	5.5	6.0	15.5	11.0	13.0
29	---	---	---	3.5	2.0	3.0	9.5	4.5	7.0	16.5	13.0	14.5
30	---	---	---	1.5	1.5	1.5	8.5	6.5	7.0	16.0	12.5	14.0
31	---	---	---	3.5	1.0	2.0	---	---	---	16.5	11.0	13.5
MONTH	4.0	.0	1.0	6.0	.0	2.0	10.5	.0	5.0	16.5	4.0	10.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	13.5	12.5	13.0	21.0	14.0	17.0	18.5	16.0	17.0	16.5	14.5	16.0
2	15.5	11.5	13.5	21.0	15.0	17.5	20.5	15.5	17.5	14.5	13.0	13.5
3	15.0	13.5	14.0	21.0	16.0	18.0	20.5	16.0	18.0	16.0	10.5	13.5
4	19.0	13.5	16.0	22.0	16.5	19.0	20.0	16.5	18.0	15.0	13.0	13.5
5	18.0	15.0	16.5	23.0	16.0	19.0	20.5	14.5	17.5	13.0	12.5	13.0
6	18.5	14.5	16.5	24.0	16.5	20.0	18.0	15.0	16.5	15.5	12.5	13.5
7	16.0	13.5	14.5	24.5	17.5	21.0	17.0	15.0	16.0	14.5	13.0	13.5
8	16.0	13.5	14.5	24.5	18.0	21.5	20.0	14.0	16.5	13.5	12.0	12.5
9	16.5	13.5	15.0	24.0	18.5	21.0	17.5	14.0	15.5	14.5	9.5	12.0
10	18.5	14.5	16.5	23.5	16.5	20.0	17.0	14.5	16.0	16.0	12.5	14.5
11	18.0	15.0	16.5	22.0	16.5	19.5	18.0	13.0	15.5	15.5	13.0	14.5
12	19.5	15.0	17.0	21.0	17.5	19.5	19.5	14.5	17.0	16.0	12.0	14.0
13	18.5	16.0	17.0	23.0	16.5	19.5	19.5	16.0	17.5	17.0	12.5	15.0
14	18.0	16.0	17.0	19.0	15.5	17.0	19.5	17.5	18.0	16.0	13.0	14.5
15	19.5	17.5	18.0	18.5	13.0	16.0	17.0	15.5	16.5	13.5	12.0	13.0
16	18.0	16.0	17.0	17.5	15.5	16.0	18.0	13.5	15.5	12.5	11.0	12.0
17	18.5	13.5	16.0	18.5	15.0	16.5	17.5	12.0	15.0	13.0	10.5	12.0
18	19.5	16.0	17.5	19.5	15.0	17.0	15.5	12.0	13.5	12.5	9.5	11.0
19	18.5	15.0	16.5	21.0	15.5	18.0	17.0	11.0	14.0	13.0	10.0	11.5
20	16.0	14.5	15.0	18.5	14.0	16.0	17.5	12.5	15.0	12.0	9.0	10.5
21	17.5	13.5	15.0	18.0	13.5	15.5	17.5	12.5	15.0	11.0	8.5	10.0
22	16.5	14.0	15.0	18.5	12.5	15.5	17.0	13.0	15.0	11.0	8.0	9.5
23	17.0	12.5	15.0	17.5	12.5	15.5	17.5	14.5	16.0	---	---	---
24	17.0	14.5	15.5	18.5	14.5	16.5	17.5	14.5	16.0	---	---	---
25	18.5	14.0	16.0	17.5	15.0	16.5	16.0	12.5	14.5	11.0	10.0	10.5
26	19.0	13.0	16.0	17.0	12.5	14.5	15.5	14.5	15.0	12.0	11.0	11.5
27	19.5	13.5	16.5	17.0	11.5	14.5	15.0	14.5	14.5	11.5	9.0	10.0
28	16.5	15.0	16.0	17.0	13.0	15.0	16.5	12.5	14.5	10.0	7.5	9.0
29	19.0	15.0	16.5	18.0	12.0	15.0	16.5	14.5	15.5	9.5	8.5	9.5
30	20.5	15.5	17.5	17.5	12.5	15.5	16.0	15.0	15.5	9.5	8.5	9.0
31	---	---	---	20.0	14.5	17.5	17.0	15.0	16.0	---	---	---
MONTH	20.5	11.5	16.0	24.5	11.5	17.5	20.5	11.0	16.0			

04059000 ESCANABA RIVER AT CORNELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°54'31", long 87°12'49", in NW¼ sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft (15 m) downstream from bridge on County Road 519, 0.4 mi (0.6 km) downstream from Bobs Creek, 0.7 mi (1.1 km) northeast of Cornell, and 16 mi (26 km) upstream from mouth.

DRAINAGE AREA.--870 mi^2 (2,253 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904.

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft (228.374 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi (16 km) downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation caused by Boney Falls powerplant 7 mi (11 km) upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 50 mi (80 km) upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) about 60 mi (97 km) upstream.

AVERAGE DISCHARGE.--40 years, (water years 1904-12, 1951-81), 888 ft^3/s (25.15 m^3/s), 13.86 in/yr (352 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s (303 m^3/s) Apr. 26, 1979, gage height, 5.00 ft (1.524 m); maximum gage height, 6.40 ft (1.951 m) Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft^3/s (2.55 m^3/s) July 5, 1910, gage height, 1.5 ft (0.46 m), site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,840 ft^3/s (109 m^3/s) June 16, gage height, 3.38 ft (1.030 m); minimum daily discharge, 200 ft^3/s (5.66 m^3/s) Feb. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG.	SEP
1	902	544	448	280	290	530	2040	1570	605	1060	353	457
2	983	526	414	260	290	500	2080	1320	544	1100	670	405
3	749	521	326	260	270	490	2190	1410	670	862	950	374
4	737	491	400	280	250	490	2870	1790	989	704	1640	372
5	716	466	480	270	240	420	3280	2500	954	934	1650	347
6	676	443	515	230	230	420	3190	2990	815	732	1410	321
7	637	420	506	240	210	410	2950	2900	687	660	1320	386
8	621	423	503	250	210	440	2700	2580	674	600	1400	449
9	572	467	512	230	210	380	2470	2140	669	560	1320	499
10	529	491	400	230	210	400	2320	1770	652	499	1250	471
11	514	495	220	220	200	390	2250	1550	584	471	1310	446
12	491	486	290	220	250	410	2240	1350	570	443	1360	416
13	534	548	250	210	210	400	2170	1180	574	432	1130	437
14	440	699	210	210	280	400	2320	1120	1710	393	888	372
15	458	722	320	210	270	410	2310	990	3240	371	813	371
16	435	717	290	230	270	370	2070	921	3690	371	737	361
17	466	663	230	220	270	360	1900	864	3560	368	690	397
18	485	675	250	250	290	350	1720	831	2810	366	578	383
19	363	709	280	270	320	340	1630	674	2160	380	486	414
20	527	608	250	260	350	340	1380	635	1590	549	449	336
21	588	587	280	270	370	360	1280	615	1430	749	436	353
22	455	645	290	280	420	370	1220	561	1280	774	414	345
23	483	552	280	280	470	400	2030	562	1120	635	410	323
24	379	556	270	270	500	440	3130	560	1070	543	416	320
25	506	420	260	280	550	480	3240	573	1180	501	383	339
26	714	440	260	280	580	460	2920	624	1060	528	367	327
27	681	450	270	280	570	540	2460	645	924	501	371	316
28	686	463	290	280	560	800	2160	650	819	434	441	350
29	731	460	270	280	---	1110	1950	652	1010	394	417	429
30	637	457	280	300	---	1570	1720	617	1050	349	388	253
31	631	---	290	290	---	1910	---	632	---	349	408	---
TOTAL	18326	16144	10134	7920	9140	16690	68190	37776	38690	17612	24855	11369
MEAN	591	538	327	255	326	538	2273	1219	1290	568	802	379
MAX	983	722	515	300	580	1910	3280	2990	3690	1100	1650	499
MIN	363	420	210	210	200	340	1220	560	544	349	353	253
CFSM	.68	.62	.38	.29	.38	.62	2.61	1.40	1.48	.65	.92	.44
IN.	.78	.69	.43	.34	.39	.71	2.92	1.62	1.65	.75	1.06	.49

CAL YR 1980 TOTAL 225588 MEAN 616 MAX 3750 MIN 210 CFSM .71 IN 9.65
WTR YR 1981 TOTAL 276846 MEAN 758 MAX 3690 MIN 200 CFSM .87 IN 11.84

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1975 to September 1981. Since October 1975, daily figures of instrument-recorded conductance below 200 micromhos are not representative due to variability within the stream cross-section. Results of a study of this variance are available in the District files.
WATER TEMPERATURES: February 1975 to September 1981.

INSTRUMENTAITON.--Water-quality monitor since October 1975.

REMARKS.--Monthly samples were collected as a cross-section sample in the reach of stream from the bridge on County Road 519 to a point 200 ft (61 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily (water years 1975-76, 1978-80), 360 micromhos Sept. 10, 1975; minimum observed (water years 1975-76, 1978-81), 114 micromhos Apr. 15, 1981.
WATER TEMPERATURES: Maximum daily, 35.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 30.5°C July 10; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 16...	1015	435	208	8.0	4.5	13.0	102	K7	--	86	7	20
NOV 10...	1145	465	212	8.0	.5	14.3	101	<1	K1	88	9	21
DEC 10...	1115	616	277	8.0	.0	14.2	100	--	K5	88	0	21
JAN 08...	1215	340	287	7.7	.0	12.1	85	K1	<1	94	0	23
FEB 12...	1300	252	308	7.6	.0	11.9	84	K1	K2	110	0	26
MAR 18...	1030	510	264	7.6	.0	14.2	100	K2	81	100	0	25
APR 15...	1500	2310	114	7.5	6.0	13.0	105	K2	K4	51	4	12
MAY 12...	1130	1380	135	7.8	8.0	12.1	104	<1	<1	61	4	14
JUN 10...	1300	689	178	8.0	21.5	9.7	114	K2	K2	75	4	18
JUL 07...	1300	662	156	8.0	26.0	9.8	124	K9	59	75	6	18
AUG 12...	1415	1400	160	8.0	19.0	9.5	104	22	83	78	2	18
SEP 16...	1230	362	220	7.8	15.5	10.7	109	<1	K5	100	2	24

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT 16...	8.8	9.9	20	.5	.9	.70	110	0	79	1.5	14
NOV 10...	8.7	11	21	.5	.8	.60	110	0	90	1.5	14
DEC 10...	8.7	16	28	.7	1.2	.90	140	0	115	2.0	18
JAN 08...	8.9	19	30	.9	.9	.70	140	0	115	4.5	22
FEB 12...	11	27	34	1.1	1.4	1.0	160	0	131	6.4	27
MAR 18...	9.6	16	25	.7	1.2	.90	140	0	115	5.6	21
APR 15...	5.2	4.6	16	.3	.7	.50	57	0	47	2.5	8.4
MAY 12...	6.2	6.6	19	.4	.7	.50	70	0	57	1.9	13
JUN 10...	7.2	10	22	.5	.7	.50	86	0	71	1.3	14
JUL 07...	7.4	6.8	16	.3	.7	.50	84	0	69	1.4	7.0
AUG 12...	8.0	6.2	15	.3	.7	.50	92	0	75	1.4	6.3
SEP 16...	10	10	18	.4	1.1	--	120	0	98	3.0	13

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT 16...	4.1	.1	9.1	142	115	167	.14	.14	.030	.030	.04
NOV 10...	3.8	.1	9.5	141	117	177	.15	.15	.030	.030	.04
DEC 10...	6.2	.1	11	166	144	276	.28	.28	.040	.040	.05
JAN 08...	6.0	.1	14	168	164	154	.23	.22	.040	.030	.04
FEB 12...	7.9	<.1	7.7	203	188	138	.30	.29	.020	.010	.01
MAR 18...	5.8	.1	13	167	162	230	.27	.27	.020	.010	.01
APR 15...	2.7	<.1	6.2	82	66	511	.23	.23	.090	.090	.12
MAY 12...	3.5	<.1	5.3	100	88	373	.13	.13	.040	.020	.03
JUN 10...	4.2	<.1	6.1	128	102	238	.15	.05	.040	.040	.05
JUL 07...	3.2	.1	6.7	127	93	227	.09	.09	.020	.020	.03
AUG 12...	3.4	.1	8.8	138	97	522	.09	.09	.020	.010	.01
SEP 16...	4.5	.1	7.9	147	130	144	.12	.12	.010	<.010	.01

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 16...	.21	.24	.38	1.7	.010	.03	.000	--	6	7.0	100
NOV 10...	.20	.23	.38	1.7	.010	.00	.010	11	2	2.5	100
DEC 10...	.19	.23	.51	2.3	.010	.03	.000	7.8	--	--	--
JAN 08...	.21	.25	.48	2.1	.020	.06	.020	--	2	1.8	100
FEB 12...	.17	.19	.49	2.2	.030	.06	.030	7.6	2	1.4	100
MAR 18...	.18	.20	.47	2.1	.010	.03	.010	7.5	4	5.5	100
APR 15...	.03	.12	.35	1.5	.020	.06	<.010	--	4	25	100
MAY 12...	.51	.55	.68	3.0	<.010	.03	<.010	10	2	7.5	100
JUN 10...	.54	.58	.73	3.2	.010	.03	<.010	16	5	9.3	100
JUL 07...	1.2	1.20	1.3	5.7	<.010	.03	<.010	--	4	7.1	100
AUG 12...	.87	.89	.98	4.3	.020	.06	.010	21	4	15	100
SEP 16...	.49	.50	.62	2.7	<.010	--	<.010	8.4	1	.98	100

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)
OCT 16...	1015	--	2	100	30	--	4	30	0	0	0
JAN 08...	1215	1	1	<50	10	--	1	20	10	0	0
APR 15...	1500	1	1	100	20	1	1	10	<10	1	0
JUL 07...	1300	9	1	<50	10	1	<1	10	<10	1	1

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)
OCT 16...	--	2	780	350	1	1	30	20	.2	.1
JAN 08...	2	1	610	320	4	3	10	4	.3	<.1
APR 15...	3	2	660	360	8	0	30	10	<.1	<.1
JUL 07...	3	0	780	470	8	1	50	20	1.3	.5

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
OCT 16...	1	1	0	0	0	0	10	6	11	.2
JAN 08...	5	4	0	0	0	0	20	0	5.3	.2
APR 15...	2	2	0	0	0	0	40	10	19	.3
JUL 07...	1	1	0	0	0	0	20	<4	18	.4

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 10,80		MAR 18,81		MAY 12,81		JUN 10,81	
TIME	1145		1030		1130		1300	
TOTAL CELLS/ML	39		150		100		220	
DIVERSITY: DIVISION	0.0		1.2		0.8		1.3	
.CLASS	0.0		1.2		0.8		1.3	
..ORDER	0.0		1.2		1.3		1.3	
...FAMILY	0.9		2.4		2.5		2.2	
....GENUS	0.9		2.4		2.5		2.2	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	13	8	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	26#	17	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	26#	25	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	13	13	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	26#	67	--	-	26#	25	64#	29
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	13	6
...DIATOMACEAE								
....DIATOMA	--	-	26#	17	13	13	--	-
...FRAGILARIACEAE								
....FRAGILARIA	--	-	--	-	--	-	13	6
....SYNEDRA	--	-	--	-	13	13	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	13#	33	26#	17	--	-	13	6
...NITZSCHIACEAE								
....NITZSCHIA	--	-	51#	33	13	13	13	6
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	13	8	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	--	-	90#	41
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	13	6

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 7,81	AUG 12,81	SEP 16,81
TIME	1300	1415	1230
TOTAL CELLS/ML	300	1500	110
DIVERSITY: DIVISION	1.5	1.3	0.0
.CLASS	1.5	1.3	0.0
..ORDER	1.9	1.9	0.0
...FAMILY	2.9	2.7	0.8
....GENUS	2.9	2.7	0.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	13	4	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	41	3	--	-
....OOCYSTIS	51#	17	14	1	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	51#	17	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	13	4	27	2	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	13	4	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	39	13	160	11	--	-
....COCCONEIS	--	-	--	-	27#	25
...CYMBELLACEAE						
....CYMBELLA	--	-	27	2	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	55	4	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	69	5	--	-
...NAVICULACEAE						
....NAVICULA	39	13	110	8	82#	75
...NITZSCHIACEAE						
....NITZSCHIA	13	4	55	4	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	64#	22	330#	23	--	-
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	550#	38	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	14	1	--	-
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GLENODINIACEAE						
....GLENODINIUM	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	ONCE-DAILY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER	NOVEMBER		DECEMBER			JANUARY	
1	195	---	290	269	---	233	228	231
2	192	---	276	257	---	233	224	232
3	205	---	271	260	265	232	224	228
4	---	---	269	256	262	249	223	229
5	216	---	269	259	262	247	229	238
6	213	---	274	265	269	237	229	232
7	221	---	276	268	271	243	231	237
8	219	---	285	268	275	284	234	255
9	219	---	287	260	---	263	244	256
10	225	241	284	267	---	265	247	257
11	223	233	---	---	---	---	---	---
12	---	229	299	275	---	263	249	256
13	223	---	294	267	---	256	248	252
14	228	245	297	288	---	252	248	250
15	231	246	297	274	---	257	251	252
16	226	223	283	271	---	268	252	255
17	228	222	296	276	---	256	253	255
18	234	224	292	278	---	259	255	257
19	238	228	283	255	---	258	256	257
20	236	224	276	254	262	259	257	258
21	245	229	273	250	260	259	258	258
22	---	230	264	250	255	261	258	260
23	---	225	259	241	248	262	260	261
24	---	228	243	241	242	264	262	263
25	---	246	243	240	242	268	263	266
26	---	244	241	237	239	267	262	265
27	---	250	239	236	238	266	263	264
28	---	249	237	235	235	267	266	266
29	---	257	235	232	233	267	266	266
30	---	269	235	233	234	268	266	267
31	---	---	234	228	231	269	267	269

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	ONCE-DAILY	ONCE-DAILY
		FEBRUARY			MARCH		APRIL	MAY
1	271	268	269	247	244	---	185	---
2	270	266	269	249	245	---	195	174
3	272	266	270	252	247	---	194	182
4	274	271	---	250	246	---	163	181
5	277	276	---	251	247	---	153	166
6	276	274	---	253	247	---	150	165
7	278	276	---	254	245	---	160	162
8	280	279	---	248	244	---	166	166
9	282	281	---	252	246	---	167	165
10	282	280	---	250	246	---	164	170
11	283	281	---	250	243	---	162	178
12	282	279	---	251	242	---	160	184
13	287	278	---	253	246	---	174	189
14	288	281	---	251	236	---	167	194
15	282	279	---	247	238	---	187	198
16	287	280	---	246	235	---	188	205
17	286	277	---	247	235	---	206	216
18	284	280	---	244	236	---	---	217
19	285	276	---	245	240	243	---	222
20	281	275	---	247	236	242	196	224
21	277	269	---	250	236	244	193	235
22	298	270	---	256	246	251	192	244
23	292	268	---	257	244	250	---	242
24	277	266	---	251	239	244	157	242
25	281	256	---	246	231	237	153	244
26	258	250	---	234	228	230	158	242
27	260	249	---	233	216	223	168	240
28	250	248	---	224	212	218	178	244
29	---	---	---	232	200	217	179	246
30	---	---	---	236	200	216	---	236
31	---	---	---	---	---	---	---	231
MONTH	298	248		257	200			

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	236	234	---	231	227	---	266	239	258	285	254	
2	243	235	---	259	202	206	297	256	273	281	258	
3	244	214	---	209	201	205	288	165	246	302	283	
4	245	211	---	217	205	211	228	174	197	294	292	
5	242	216	---	205	196	200	233	187	207	292	283	
6	246	218	---	212	201	206	256	224	240	288	284	
7	233	217	---	210	206	208	257	233	240	287	242	
8	231	219	---	---	---	---	292	238	269	300	247	
9	229	192	---	259	213	217	274	243	259	296	281	
10	233	190	---	235	219	227	285	234	259	298	288	
11	220	204	211	265	225	244	246	226	236	295	262	
12	230	215	221	256	239	248	241	217	230	---	---	
13	232	221	224	254	238	244	263	233	244	---	---	
14	237	226	231	252	236	243	247	233	240	284	265	
15	224	204	218	244	233	237	266	236	247	264	256	
16	203	196	199	252	235	241	258	240	---	260	256	
17	195	186	189	266	203	241	248	236	---	258	253	
18	193	185	189	264	221	239	244	232	---	254	247	
19	195	183	189	261	251	256	249	228	---	267	254	
20	199	193	196	258	196	236	258	239	---	278	268	
21	199	196	198	248	186	212	262	245	---	275	265	
22	202	197	199	255	235	243	266	256	---	266	258	
23	204	198	202	257	240	246	283	262	---	270	256	
24	223	204	213	255	245	250	274	254	---	278	269	
25	214	206	211	263	200	239	271	254	---	---	---	
26	214	206	210	260	246	252	271	230	---	---	---	
27	216	211	213	272	236	245	262	252	---	---	---	
28	221	213	216	281	249	264	258	229	---	---	---	
29	243	222	238	267	251	258	266	238	---	299	272	
30	241	234	237	270	255	264	---	---	---	289	239	
31	---	---	---	272	251	258	296	252	---	---	---	
MONTH	246	183					297	165				

TEMPERATURE, WATER (DEG. C), WATFR YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	12.5	11.5	12.0	---	---	---	3.0	.0	1.0	.0	.0	.0
2	11.5	9.5	10.5	---	---	---	2.5	.0	.5	.0	.0	.0
3	10.0	8.5	9.0	---	---	---	.5	.0	.5	.0	.0	.0
4	9.0	7.0	7.5	---	---	---	.5	.0	.0	.0	.0	.0
5	10.5	6.0	7.5	---	---	---	.5	.0	.0	.0	.0	.0
6	11.5	6.5	8.5	---	---	---	.5	.0	.5	.0	.0	.0
7	12.0	6.5	9.0	---	---	---	.5	.0	.5	.0	.0	.0
8	13.5	8.5	10.0	---	---	---	.5	.0	.5	.0	.0	.0
9	12.5	7.0	9.0	---	---	---	.5	.0	.0	.0	.0	.0
10	13.5	7.0	9.5	1.5	.0	---	1.5	.0	.0	.0	.0	.0
11	9.5	7.0	8.5	3.5	.0	1.0	1.5	.0	.5	.0	.0	.0
12	9.0	6.5	7.5	4.5	.0	1.5	.0	.0	.0	.0	.0	.0
13	7.5	6.0	7.0	4.0	2.5	3.5	1.5	.0	.5	.0	.0	.0
14	8.0	5.0	6.5	3.5	1.0	1.5	.5	.0	.0	.0	.0	.0
15	10.5	5.0	7.0	1.5	.0	1.0	.5	.0	.0	.0	.0	.0
16	7.0	4.0	6.0	4.5	.0	1.5	1.0	.0	.0	.0	.0	.0
17	12.0	7.0	9.0	1.5	.0	.5	.5	.0	.0	.0	.0	.0
18	8.5	5.0	7.0	3.0	.0	1.0	1.0	.0	.0	.0	.0	.0
19	7.0	4.5	5.5	4.0	.0	2.0	.5	.0	.0	.0	.0	.0
20	8.0	5.5	6.5	2.0	.5	1.5	.0	.0	.0	.0	.0	.0
21	8.5	5.5	6.5	2.5	.5	1.0	.0	.0	.0	.0	.0	.0
22	---	---	---	2.5	.5	1.5	.5	.0	.0	.0	.0	.0
23	---	---	---	2.0	.5	1.0	.5	.0	.0	.0	.0	.0
24	---	---	---	1.5	.0	.5	.0	.0	.0	.0	.0	.0
25	---	---	---	2.5	.0	1.0	.0	.0	.0	.0	.0	.0
26	---	---	---	2.5	.0	1.5	.0	.0	.0	.0	.0	.0
27	---	---	---	4.0	.0	1.0	.0	.0	.0	.0	.0	.0
28	---	---	---	1.5	.0	.5	.0	.0	.0	.0	.0	.0
29	---	---	---	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
30	---	---	---	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
31	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
MONTH							3.0	.0	.0	.0	.0	.0

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	2.0	.5	1.0	10.5	6.0	
2	.0	.0	.0	.0	.0	.0	2.5	.5	1.5	9.5	6.5	
3	.0	.0	.0	.0	.0	.0	4.0	1.5	2.5	8.5	6.5	
4	.0	.0	.0	.0	.0	.0	2.0	.0	1.0	9.5	7.0	
5	.0	.0	.0	.0	.0	.0	1.5	.0	.5	9.5	7.5	
6	.0	.0	.0	.0	.0	.0	2.0	.0	1.5	9.5	6.5	
7	.0	.0	.0	.0	.0	.0	2.5	1.5	2.0	10.0	7.0	
8	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	10.0	7.5	
9	.0	.0	.0	.0	.0	.0	3.5	1.0	2.5	10.5	7.0	
10	.0	.0	.0	.0	.0	.0	5.5	2.5	4.5	8.5	5.5	
11	.0	.0	.0	.0	.0	.0	7.0	4.5	5.5	8.5	5.5	
12	.0	.0	.0	.0	.0	.0	6.5	5.0	5.5	11.0	5.5	
13	.0	.0	.0	.0	.0	.0	6.0	5.0	5.5	12.5	6.5	
14	.0	.0	.0	.0	.0	.0	6.0	3.5	4.5	14.0	7.5	
15	.0	.0	.0	.0	.0	.0	6.0	3.5	---	16.0	9.0	
16	.0	.0	.0	.0	.0	.0	7.0	4.5	---	15.5	9.5	
17	.0	.0	.0	.0	.0	.0	9.0	6.5	---	15.5	8.5	
18	.0	.0	.0	.0	.0	.0	8.5	5.5	---	15.5	7.5	
19	.0	.0	.0	.0	.0	.0	6.5	4.5	---	17.5	7.0	
20	.0	.0	.0	.0	.0	.0	6.5	3.0	---	16.5	7.5	
21	.0	.0	.0	.0	.0	.0	5.5	3.0	---	19.5	9.0	
22	.0	.0	.0	.0	.0	.0	5.5	4.0	---	18.5	9.5	
23	.0	.0	.0	.5	.0	.0	5.0	4.0	---	19.5	14.0	
24	.0	.0	.0	.0	.0	.0	5.0	3.5	---	16.0	13.5	
25	.0	.0	.0	.5	.0	.0	6.0	3.0	---	20.0	14.0	
26	.0	.0	.0	.5	.0	.0	6.5	5.0	---	16.0	13.5	
27	.0	.0	.0	.5	.0	.0	7.0	5.0	---	15.5	11.0	
28	.0	.0	.0	.5	.0	.5	6.5	5.5	---	19.5	9.5	
29	---	---	---	1.0	.0	.5	8.5	5.0	---	18.0	11.5	
30	---	---	---	1.0	.0	.5	9.0	6.5	---	21.0	10.0	
31	---	---	---	1.5	.0	.5	---	---	---	21.5	11.5	
MONTH	.0	.0	.0	1.5	.0	.0	9.0	.0		21.5	5.5	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.5	13.0	---	---	---	---	26.5	18.5	21.5	19.5	16.5	
2	21.0	12.0	---	22.5	---	---	24.0	19.5	21.0	20.0	15.5	
3	20.5	15.0	---	23.5	18.5	20.0	25.5	18.5	21.0	24.0	13.5	
4	21.0	15.0	---	24.5	18.0	20.5	19.5	17.5	18.5	20.0	14.5	
5	23.0	16.0	---	26.0	18.0	21.0	19.5	17.0	18.5	16.5	14.5	
6	22.0	16.5	---	28.5	18.0	22.0	18.5	17.5	18.0	18.0	14.5	
7	20.5	14.0	---	---	---	---	18.0	17.0	17.5	16.0	14.0	
8	20.5	15.5	---	---	---	---	19.5	16.5	18.0	18.0	12.0	
9	22.0	14.5	---	28.5	---	---	19.5	16.5	18.0	19.5	10.5	
10	22.0	15.5	---	30.5	20.0	24.5	20.0	17.0	18.0	22.5	13.5	
11	22.5	14.5	18.0	27.5	21.0	23.5	19.5	15.5	17.5	21.5	15.5	
12	24.5	15.5	19.5	27.0	21.0	24.0	18.5	16.5	17.0	22.0	13.5	
13	20.0	16.0	18.0	29.5	20.0	24.5	19.5	17.5	18.5	23.0	14.0	
14	17.5	15.5	16.5	27.0	19.5	23.0	21.0	18.0	19.0	21.0	14.0	
15	18.0	15.0	16.5	26.5	18.5	23.0	21.5	16.5	18.5	18.5	13.5	
16	18.0	15.5	17.0	24.0	20.0	21.5	22.0	16.0	---	17.5	12.0	
17	17.5	14.0	16.0	28.0	19.5	22.5	22.0	14.0	---	16.0	10.5	
18	18.0	16.0	17.0	26.5	18.5	22.0	21.0	13.0	---	15.5	9.5	
19	18.0	15.5	16.5	28.5	19.5	23.5	23.5	14.0	---	17.0	11.0	
20	16.5	15.0	15.5	22.0	17.5	20.0	24.5	14.5	---	15.0	7.0	
21	17.0	14.0	15.5	20.0	15.5	17.5	24.5	15.5	---	13.0	9.5	
22	17.5	15.0	16.0	17.5	14.5	16.0	22.0	16.0	---	15.0	7.0	
23	19.0	13.5	16.0	19.0	15.0	17.0	25.0	17.5	---	16.5	6.0	
24	18.5	14.5	16.5	21.0	16.5	18.5	26.0	17.5	---	15.0	9.0	
25	19.5	15.0	17.0	23.0	16.5	19.0	24.0	17.0	---	12.0	11.0	
26	20.5	14.0	17.0	21.0	16.0	18.5	21.0	19.0	---	13.5	11.0	
27	21.0	14.5	---	23.0	14.5	18.0	21.5	16.5	---	11.0	8.0	
28	17.5	15.5	---	22.0	15.0	18.0	22.0	16.0	---	15.0	7.0	
29	19.5	15.5	17.0	25.0	14.5	19.5	21.0	16.5	---	12.5	9.0	
30	20.5	15.0	---	25.0	16.5	20.5	23.5	17.5	---	10.5	9.0	
31	---	---	---	27.0	17.5	21.5	24.0	18.5	---	---	---	
MONTH	24.5	12.0					26.5	13.0		24.0	6.0	

04059500 FORD RIVER NEAR HYDE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°45'20", long 87°12'05", in SW¼ sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft (12 m) downstream from bridge on County Road 533, 1.4 mi (2.3 km) downstream from Tenmile Creek, and 1.5 mi (2.4 km) north of Hyde.

DRAINAGE AREA.--450 mi^2 (1,166 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 681.77 ft (207.80 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--27 years, 382 ft^3/s (10.82 m^3/s), 11.53 in/yr (293 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft^3/s (215 m^3/s) May 7, 1960, gage height, 8.27 ft (2.521 m); minimum, 18 ft^3/s (0.51 m^3/s) Aug. 30, 1976, gage height, 1.33 ft (0.405 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,870 ft^3/s (53.0 m^3/s) June 18, 19, gage height, 4.72 ft (1.439 m); minimum daily, 60 ft^3/s (1.70 m^3/s) Feb. 9, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	534	231	169	80	78	320	1040	915	190	558	160	116
2	457	214	150	80	76	310	1080	804	179	543	173	114
3	401	203	114	78	74	290	1140	785	223	491	282	105
4	362	196	115	78	72	280	1610	1060	288	398	688	97
5	327	187	125	78	70	270	1740	1220	301	345	846	91
6	300	176	140	78	68	260	1660	1270	282	300	818	87
7	275	173	160	76	66	260	1620	1260	243	252	796	92
8	253	168	180	76	62	250	1610	1270	211	206	714	113
9	230	176	170	74	60	250	1540	1270	193	175	606	129
10	211	187	150	72	60	250	1360	1150	179	147	566	159
11	197	193	130	70	62	250	1220	958	160	129	567	179
12	185	196	120	70	68	240	1110	774	145	117	558	178
13	172	257	110	70	76	240	1030	624	137	106	524	149
14	166	313	105	70	82	240	1060	540	311	96	471	126
15	161	340	100	70	94	230	1060	474	1160	89	407	109
16	158	316	96	72	105	230	1020	421	1600	83	346	98
17	158	321	94	72	120	220	976	375	1670	85	289	90
18	164	308	92	74	140	210	901	333	1800	110	242	85
19	169	222	88	76	160	210	837	301	1810	136	206	82
20	173	235	86	76	190	210	781	274	1490	168	174	80
21	173	264	86	76	230	215	712	250	1140	294	152	79
22	168	213	82	78	260	220	654	229	836	459	136	76
23	161	257	82	78	290	235	1030	216	590	497	125	74
24	163	253	82	80	320	250	1640	206	528	488	115	72
25	195	173	82	80	340	270	1650	197	528	426	105	73
26	251	173	82	80	350	290	1550	200	493	384	100	75
27	300	172	82	80	350	325	1460	204	455	359	97	74
28	328	206	82	80	330	420	1350	204	398	345	97	74
29	315	212	82	80	---	564	1210	206	416	293	128	73
30	284	191	82	80	---	773	1040	204	539	233	131	76
31	255	---	82	78	---	938	---	197	---	186	122	---
TOTAL	7646	6726	3400	2360	4253	9520	36691	18391	18495	8498	10741	3025
MEAN	247	224	110	76.1	152	307	1223	593	617	274	346	101
MAX	534	340	180	80	350	938	1740	1270	1810	558	846	179
MIN	158	168	82	70	60	210	654	197	137	83	97	72
CFSM	.55	.50	.24	.17	.34	.68	2.72	1.32	1.37	.61	.77	.22
IN.	.63	.56	.28	.20	.35	.79	3.03	1.52	1.53	.70	.89	.25

CAL YR 1980 TOTAL 101742 MEAN 278 MAX 2660 MIN 54 CFSM .62 IN 8.41
WTR YR 1981 TOTAL 129746 MEAN 355 MAX 1810 MIN 60 CFSM .79 IN 10.73

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1974 to September 1981.
WATER TEMPERATURES: July 1956 to September 1981.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor since October 1975.

REMARKS.--In addition to the water-quality monitor, samples were collected periodically by a local observer. Monthly samples were collected as a cross-section sample in reach of stream 200 ft (61 m) upstream to 200 ft (61 m) downstream from gage. Interruptions in the daily record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.
WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum observed, 433 micromhos Feb. 14; minimum, 180 micromhos Apr. 5.
WATER TEMPERATURES: Maximum, 28.5°C July 7-9; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 15...	1330	154	288	8.1	5.0	13.1	105	K3	K1	150	3	35
NOV 10...	1415	189	288	8.3	1.5	14.0	101	K4	K3	150	13	35
DEC 09...	1330	177	344	8.2	.0	13.5	95	K4	28	160	0	38
JAN 07...	1400	76	386	7.8	.0	8.7	61	<1	<1	190	0	45
FEB 10...	1230	59	380	7.4	.0	10.0	70	K1	<1	210	0	49
MAR 17...	1130	223	350	8.0	.0	13.5	95	<1	<1	170	0	41
APR 15...	1100	1060	208	7.9	4.0	13.3	102	K5	<1	110	5	26
MAY 13...	1100	638	212	8.1	9.0	11.3	99	K3	<1	110	2	26
JUN 09...	1500	192	272	8.1	19.0	9.3	103	K7	K2	160	9	38
JUL 08...	1115	207	272	8.1	26.0	8.2	104	23	K10	150	6	35
AUG 11...	1345	572	255	8.3	18.0	9.2	99	40	46	150	6	34
SEP 15...	1400	111	308	8.1	17.0	9.9	104	20	30	180	13	41

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCT/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 15...	16	1.4	2	.1	.6	.40	192	0	157	2.3	7.5
NOV 10...	16	1.6	2	.1	.6	.40	188	0	154	1.4	6.3
DEC 09...	15	1.4	2	.0	.6	.40	210	0	172	2.1	8.4
JAN 07...	20	1.1	1	.0	.7	.50	250	0	205	6.3	11
FEB 10...	22	1.6	2	.0	.8	.60	270	0	221	16	12
MAR 17...	17	1.5	2	.1	.8	.60	210	0	172	3.4	10
APR 15...	11	1.8	3	.1	.6	.40	128	0	105	2.4	6.6
MAY 13...	12	1.2	2	.0	.4	.30	132	0	108	1.6	6.6
JUN 09...	16	1.9	3	.1	.7	.50	184	0	151	2.3	6.0
JUL 08...	16	1.5	2	.1	.6	.40	176	0	144	2.2	2.9
AUG 11...	15	1.5	2	.1	.4	.30	176	0	144	1.3	5.0
SEP 15...	19	1.7	2	.1	.8	--	204	0	167	2.5	7.0

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT 15...	1.9	.1	7.4	188	160	78.2	.03	.03	.050	.040	.05
NOV 10...	1.9	.1	6.7	191	152	97.5	.02	.02	.010	.010	.01
DEC 09...	2.4	.1	7.3	200	177	95.6	.15	.15	.040	.040	.05
JAN 07...	2.7	.1	10	222	215	45.6	.21	.20	.050	.030	.04
FEB 10...	3.2	<.1	10	226	233	36.0	.29	.29	.060	.020	.03
MAR 17...	2.3	<.1	8.5	203	185	122	.12	.12	<.010	<.010	.01
APR 15...	1.8	<.1	3.8	137	110	392	.05	.04	.050	.050	.06
MAY 13...	2.1	<.1	3.2	141	114	243	.53	.53	.130	.130	.17
JUN 09...	2.7	<.1	4.8	190	160	98.5	.05	.03	.020	.020	.03
JUL 08...	1.8	<.1	7.2	188	149	105	.03	.03	.020	.020	.03
AUG 11...	2.0	<.1	8.8	177	145	273	.02	.02	.020	.020	.03
SEP 15...	3.0	<.1	7.6	196	176	58.7	.03	.03	.020	.020	.03

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 15...	.36	.41	.44	1.9	.020	.06	.010	--	2	.83	100
NOV 10...	.34	.35	.37	1.6	.000	.00	.000	13	1	.51	100
DEC 09...	.14	.18	.33	1.5	.000	.00	.000	13	--	--	--
JAN 07...	.20	.25	.46	2.0	.020	.06	.010	--	1	.21	100
FEB 10...	.12	.18	.47	2.1	.020	.06	<.010	10	1	.16	100
MAR 17...	.27	.28	.40	1.8	.020	.06	<.010	12	4	2.4	100
APR 15...	.17	.22	.27	1.2	.020	.06	<.010	--	13	37	100
MAY 13...	.40	.53	1.1	4.7	<.010	.03	<.010	15	4	6.9	100
JUN 09...	.56	.58	.63	2.8	<.010	.03	<.010	19	3	1.6	100
JUL 08...	.71	.73	.76	3.4	<.010	.03	<.010	--	3	1.7	100
AUG 11...	.60	.62	.64	2.8	.030	.09	.010	24	6	9.3	100
SEP 15...	.41	.43	.46	2.0	.020	.06	<.010	11	1	.30	100

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 15...	1330	--	2	100	30	--	3	20	10	0	0
JAN 07...	1400	1	1	<50	10	1	0	50	10	0	0
APR 15...	1100	1	1	100	20	1	1	10	10	1	0
JUL 08...	1115	1	1	100	10	1	<1	10	<10	1	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 15...	1	1	290	160	0	0	10	10	.1	.1
JAN 07...	1	1	230	80	--	4	10	8	.3	<.1
APR 15...	4	2	190	50	9	0	--	4	.3	<.1
JUL 08...	3	1	240	110	6	1	40	20	1.3	.6

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 15...	1	0	0	0	0	0	10	8	18	.2
JAN 07...	4	3	0	0	0	0	20	0	6.9	.2
APR 15...	2	1	0	0	0	0	40	9	14	.2
JUL 08...	--	2	0	0	0	0	30	<4	16	.2

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 10,80	MAR 17,81	MAY 13,81	JUN 9,81
TIME	1415	1130	1100	1500
TOTAL CELLS/ML	150	340	450	230
DIVERSITY: DIVISION	0.4	0.9	0.8	1.5
.CLASS	0.4	0.9	0.8	1.5
..ORDER	0.8	1.1	1.4	1.7
...FAMILY	2.5	1.9	2.7	2.4
....GENUS	2.5	1.9	2.8	2.4

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....POLYEDRIOPSIS	13	8	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	51#	22
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-
....EUASTRUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	13	8	13	4	--	-	13	6
....MELOSIRA	--	-	--	-	39	9	--	-
....STEPHANODISCUS	--	-	--	-	13	3	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	13	8	--	-	39	9	39#	17
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	13	3	--	-
...DIATOMACEAE								
....DIATOMA	--	-	150#	46	140#	31	--	-
...FRAGILARIACEAE								
....FRAGILARIA	26#	17	--	-	--	-	--	-
....SYNEDRA	--	-	26	8	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	13	3	--	-
...NAVICULACEAE								
....NAVICULA	13	8	13	4	26	6	39#	17
...NITZSCHIACEAE								
....NITZSCHIA	64#	42	13	4	51	11	26	11
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	13	8	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 10,80	MAR 17,81	MAY 13,81	JUN 9,81
TIME	1415	1130	1100	1500
TOTAL CELLS/ML	150	340	450	230
DIVERSITY: DIVISION	0.4	0.9	0.8	1.5
.CLASS	0.4	0.9	0.8	1.5
..ORDER	0.8	1.1	1.4	1.7
...FAMILY	2.5	1.9	2.7	2.4
....GENUS	2.5	1.9	2.8	2.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	13	3	64#	28
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	120#	35	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	100#	23	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 8,81	AUG 11,81	SEP 15,81
TIME	1115	1345	1400
TOTAL CELLS/ML	2100	1000	600
DIVERSITY: DIVISION	0.4	1.6	1.4
.CLASS	0.4	1.6	1.5
..ORDER	0.5	1.7	2.0
...FAMILY	0.5	2.6	2.6
....GENUS	0.6	2.6	2.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....POLYEDRIOPSIS	--	-	--	-	--	-
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	--	-	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	--	-	56	9
....SELENASTRUM	--	-	41	4	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	55	5	28	5
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	26	1	14	1	14	2
..ZYGNEMATALES						
...DESMIDIACEAE						
....CLOSTERIUM	13	1	--	-	--	-
....COSMARIUM	--	-	14	1	--	-
....EUASTRUM	13	1	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	26	1	--	-	--	-
....MELOSIRA	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	13	1	55	5	70	12
....COCCONEIS	13	1	14	1	--	-
...CYMBELLACEAE						
....AMPHORA	--	-	--	-	14	2
....CYMBELLA	--	-	28	3	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	28	3	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	--	-	--	-
...NAVICULACEAE						
....NAVICULA	--	-	96	9	14	2
...NITZSCHIACEAE						
....NITZSCHIA	13	1	180#	18	28	5
...SURIRELLACEAE						
....SURIRELLA	--	-	--	-	14	2
...TABELLARIACEAE						
....TABELLARIA	--	-	--	-	--	-
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...OCHROMONADACEAE						
....OCHROMONAS	--	-	--	-	14	2
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	13	1	14	1	--	-

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 8,81		AUG 11,81		SEP 15,81	
TIME	1115		1345		1400	
TOTAL CELLS/ML	2100		1000		600	
DIVERSITY: DIVISION	0.4		1.0		1.4	
.CLASS	0.4		1.6		1.5	
..ORDER	0.5		1.7		2.0	
...FAMILY	0.5		2.6		2.6	
....GENUS	0.6		2.6		2.6	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	13	1	--	-	70	12
..NOSTOCALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	--	-
....APHANIZOMENON	1900#	93	--	-	--	-
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	280#	47
....OSCILLATORIA	--	-	470#	46	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	14	1	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	274	269	272	267	261	264	295	286	290	353	350	351
2	274	257	269	264	261	262	309	287	296	355	352	353
3	261	252	256	263	260	261	---	---	---	358	354	356
4	263	259	261	266	261	264	293	279	286	361	356	358
5	268	263	265	265	261	263	---	---	---	363	359	361
6	273	269	271	267	264	266	---	---	---	380	358	372
7	274	270	272	267	265	266	---	---	---	382	376	379
8	280	274	277	277	265	269	---	---	---	382	376	379
9	283	279	281	290	266	276	327	305	318	385	382	384
10	285	282	284	290	279	287	---	---	---	390	384	387
11	286	284	286	286	272	283	---	---	---	390	360	372
12	288	284	286	285	281	283	338	310	326	380	356	366
13	292	289	291	284	280	282	339	327	331	371	358	365
14	298	291	293	285	281	283	345	329	336	382	353	371
15	298	294	295	282	270	278	350	332	340	369	347	358
16	300	296	297	299	268	277	354	347	350	415	378	404
17	300	298	299	275	265	270	362	350	356	391	374	387
18	300	296	298	274	265	269	359	349	355	392	373	383
19	299	294	296	289	265	285	372	347	356	395	359	380
20	298	295	297	294	286	290	369	350	361	402	368	385
21	298	296	297	296	283	287	378	371	---	401	361	381
22	300	298	299	294	286	290	382	377	---	401	369	---
23	300	297	298	292	288	290	369	358	363	393	370	384
24	306	298	300	296	287	292	369	354	363	---	---	---
25	301	296	298	298	283	292	371	350	365	---	---	---
26	301	295	297	303	292	298	379	357	372	---	---	---
27	277	271	274	319	282	298	355	339	348	---	---	---
28	285	270	273	291	278	284	355	349	353	---	---	---
29	272	267	270	301	286	293	355	351	353	---	---	---
30	267	263	265	300	282	289	353	349	351	---	---	---
31	268	261	264	---	---	---	353	349	350	---	---	---
MONTH	306	252	283	319	260	280						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	318	293	300	238	234	236	207	197	202
2	---	---	---	320	293	303	235	231	233	211	205	207
3	---	---	---	327	292	303	226	204	216	212	207	209
4	---	---	---	327	301	313	226	199	216	219	212	216
5	---	---	---	332	298	311	196	180	186	218	213	216
6	---	---	---	338	320	332	191	184	186	213	201	207
7	---	---	---	341	328	333	195	185	191	205	198	202
8	---	---	---	338	326	332	192	186	188	203	200	202
9	---	---	---	343	326	335	194	188	192	186	183	185
10	407	384	397	357	332	345	202	193	197	188	184	186
11	423	400	408	338	316	330	204	201	202	191	187	189
12	421	418	---	360	323	336	210	205	207	203	196	199
13	432	410	423	357	336	348	211	209	210	210	201	204
14	433	395	404	342	321	332	212	207	209	214	207	210
15	---	---	---	339	311	323	207	204	206	236	233	234
16	---	---	---	333	301	325	206	204	205	239	235	237
17	---	---	---	344	321	329	211	205	208	256	230	246
18	---	---	---	344	323	337	214	212	213	253	250	252
19	---	---	---	348	328	341	219	216	218	259	253	254
20	357	319	340	350	332	341	223	220	222	264	258	260
21	359	317	345	347	327	337	225	221	223	273	263	267
22	343	336	340	---	---	---	226	221	224	279	271	275
23	349	331	337	340	303	323	226	222	224	282	278	280
24	343	298	316	306	260	287	221	208	217	287	279	282
25	310	294	301	276	245	259	206	198	200	292	283	287
26	304	281	293	256	249	253	200	197	198	294	291	292
27	304	286	298	290	268	279	201	197	200	293	291	292
28	303	292	298	285	262	273	202	195	198	294	288	291
29	---	---	---	263	259	262	195	191	192	292	288	290
30	---	---	---	259	249	254	201	194	197	296	293	294
31	---	---	---	249	237	240	---	---	---	293	289	292
MONTH							238	180	207	296	183	241

04050500 FORD RIVER NEAR HYDE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	295	291	293	248	245	246	285	268	275	325	318	322
2	291	289	290	242	239	241	277	267	272	317	314	315
3	285	282	283	250	237	244	270	248	263	323	317	321
4	285	280	282	253	247	250	250	232	241	329	326	328
5	286	281	283	274	247	253	251	248	250	334	329	331
6	285	281	282	267	265	266	247	242	244	332	328	330
7	280	275	277	274	258	266	246	241	244	332	324	329
8	279	273	276	277	267	272	261	245	252	327	324	326
9	278	268	274	295	283	289	258	254	256	333	320	328
10	277	274	275	305	295	300	259	254	257	329	325	327
11	287	279	283	314	299	302	252	249	251	322	312	319
12	291	292	288	---	---	---	255	248	250	314	307	311
13	296	291	293	---	---	---	255	251	254	316	310	313
14	296	273	280	---	---	---	259	255	257	317	313	314
15	282	225	252	---	---	---	265	256	261	315	309	312
16	233	208	221	---	---	---	268	262	265	324	319	322
17	226	209	217	---	---	---	278	271	274	326	323	324
18	217	203	210	---	---	---	284	276	280	329	325	326
19	206	192	196	---	---	---	296	286	290	332	329	330
20	202	193	197	332	321	327	300	292	296	333	330	332
21	213	201	207	324	297	310	311	302	306	336	334	335
22	224	213	219	295	275	284	315	304	310	345	335	337
23	234	224	230	266	261	263	311	304	308	342	339	340
24	241	231	236	251	246	249	316	309	313	346	343	344
25	241	235	239	237	234	235	321	314	318	348	345	346
26	237	234	236	247	240	244	328	325	327	348	345	346
27	237	235	236	256	251	253	332	322	326	348	346	347
28	237	234	236	258	255	257	328	320	323	349	344	346
29	243	236	239	261	258	259	327	323	325	348	345	347
30	250	241	247	262	254	258	329	323	325	349	340	346
31	---	---	---	273	259	266	330	322	326	---	---	---
MONTH	296	192	253				332	232	282	349	307	330

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	13.0	11.5	12.5	3.5	3.0	3.0	.0	.0	.0	.0	.0	.0
2	12.5	9.5	10.5	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
3	9.0	7.5	8.0	5.5	3.5	4.5	.0	.0	.0	.0	.0	.0
4	8.0	7.0	7.0	5.5	4.5	5.5	.0	.0	.0	.0	.0	.0
5	8.5	5.5	7.0	4.0	2.0	3.0	.0	.0	.0	.0	.0	.0
6	10.0	7.0	8.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
7	10.5	7.5	9.0	4.0	2.5	3.5	.0	.0	.0	.0	.0	.0
8	11.5	9.5	10.5	2.5	.5	1.5	.5	.0	.0	.0	.0	.0
9	10.5	8.0	9.0	3.5	1.5	2.5	.0	.0	.0	.0	.0	.0
10	10.5	8.5	9.5	3.0	1.0	1.5	.0	.0	.0	.0	.0	.0
11	10.5	8.0	9.5	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
12	8.0	6.5	7.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
13	7.0	5.5	6.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
14	5.5	4.5	5.0	1.5	1.0	1.5	.0	.0	.0	.0	.0	.0
15	7.0	5.0	6.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
16	7.5	6.5	7.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
17	11.5	7.5	9.5	1.0	.5	.5	.0	.0	.0	.0	.0	.0
18	10.5	8.0	9.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
19	8.0	6.0	6.5	1.0	.5	.5	.0	.0	.0	.0	.0	.0
20	6.0	5.5	6.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
21	6.0	5.0	5.5	1.5	.5	.5	.0	.0	.0	.0	.0	.0
22	6.0	4.5	5.5	1.5	.0	.5	.0	.0	.0	.0	.0	.0
23	7.0	5.5	6.0	1.0	1.0	1.0	.0	.0	.0	.0	.0	.0
24	7.5	6.5	7.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
25	7.5	5.5	6.5	.5	.0	.5	.0	.0	.0	.0	.0	.0
26	5.5	3.5	4.0	.5	.0	.5	.0	.0	.0	.0	.0	.0
27	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	3.5	1.5	2.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
29	3.0	1.5	2.5	.5	.0	.5	.0	.0	.0	.0	.0	.0
30	3.0	1.5	2.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
31	3.5	2.0	3.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	13.0	1.5	7.0	5.5	.0	1.5	.5	.0	.0	.0	.0	.0

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	4.5	3.0	3.5	11.5	7.5	9.0
2	.0	.0	.0	.0	.0	.0	6.0	2.0	4.0	10.0	7.5	9.0
3	.0	.0	.0	.0	.0	.0	6.0	3.5	4.5	9.0	8.0	8.5
4	.0	.0	.0	.0	.0	.0	5.5	2.5	4.0	10.5	8.5	9.5
5	.0	.0	.0	.0	.0	.0	4.0	1.5	2.5	11.5	8.5	10.0
6	.0	.0	.0	.0	.0	.0	5.0	1.0	2.5	12.0	7.5	9.5
7	.0	.0	.0	.0	.0	.0	4.5	3.0	3.5	12.5	8.0	10.5
8	.0	.0	.0	.0	.0	.0	4.0	3.5	4.0	11.5	9.0	10.5
9	.0	.0	.0	.0	.0	.0	5.5	2.5	4.0	11.5	9.5	10.5
10	.0	.0	.0	.0	.0	.0	8.0	4.0	5.5	9.5	7.0	8.5
11	.0	.0	.0	.0	.0	.0	9.5	6.0	7.5	9.0	6.5	8.0
12	.0	.0	.0	.0	.0	.0	8.5	6.5	7.5	12.0	6.5	9.0
13	.0	.0	.0	.0	.0	.0	7.5	6.5	7.0	13.5	8.5	11.0
14	.0	.0	.0	.0	.0	.0	7.5	5.5	6.5	15.0	9.5	12.5
15	.0	.0	.0	.0	.0	.0	8.0	4.0	6.0	16.0	10.5	13.5
16	.0	.0	.0	.0	.0	.0	8.5	5.0	7.0	16.0	12.0	14.5
17	.0	.0	.0	.0	.0	.0	10.0	7.5	8.5	15.0	11.0	13.5
18	.0	.0	.0	.0	.0	.0	10.5	7.0	9.0	15.5	10.5	13.0
19	.0	.0	.0	.0	.0	.0	9.0	6.5	7.5	16.5	11.5	14.0
20	.0	.0	.0	.0	.0	.0	8.0	4.0	6.0	17.5	13.5	15.5
21	.0	.0	.0	.5	.0	.0	6.5	4.0	5.5	19.5	15.0	17.0
22	.0	.0	.0	.5	.0	.5	6.0	5.0	5.5	19.5	17.0	18.5
23	.0	.0	.0	.5	.5	.5	5.5	4.0	5.0	19.0	17.0	18.0
24	.0	.0	.0	1.0	.5	.5	6.0	3.5	4.5	17.5	16.0	16.5
25	.0	.0	.0	2.5	.5	1.0	7.5	3.5	5.5	19.0	16.0	17.5
26	.0	.0	.0	1.0	.5	.5	7.0	5.0	6.0	18.5	16.5	17.5
27	.0	.0	.0	2.5	.5	1.0	8.0	5.0	6.5	17.0	15.0	15.5
28	.0	.0	.0	4.0	.5	1.5	7.5	6.5	7.0	18.0	13.0	15.5
29	---	---	---	4.0	2.5	3.5	9.5	5.5	7.5	19.5	16.5	18.0
30	---	---	---	3.5	2.0	3.0	10.0	7.0	8.5	19.0	16.5	18.0
31	---	---	---	4.0	1.5	2.5	---	---	---	18.0	14.5	16.5
MONTH	.0	.0	.0	4.0	.0	.5	10.5	1.0	5.5	19.5	6.5	13.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.0	16.0	17.0	23.0	18.0	20.5	25.0	22.5	24.0	22.0	20.5	21.5
2	19.0	16.0	17.5	23.5	19.0	21.5	24.0	22.5	23.5	20.0	17.0	18.5
3	20.0	17.5	18.5	24.0	20.5	22.5	25.5	22.0	23.5	20.5	15.5	18.0
4	22.0	17.0	19.5	24.0	20.5	22.5	24.0	21.0	22.5	20.5	17.5	19.0
5	22.0	18.5	20.5	25.5	21.0	23.5	23.5	20.0	22.0	18.5	16.0	17.0
6	21.5	19.0	20.5	27.0	22.0	24.5	22.5	20.0	20.5	17.0	15.5	16.0
7	20.0	17.0	17.5	28.5	24.5	26.5	20.5	19.0	19.5	16.5	16.0	16.5
8	19.0	16.0	17.5	28.5	25.5	27.5	22.0	18.0	19.5	17.0	14.5	16.0
9	20.0	16.5	18.5	28.5	26.0	27.5	21.5	18.5	20.0	17.0	13.5	15.5
10	21.0	18.0	19.5	27.5	23.5	26.0	21.5	18.5	20.0	20.0	17.0	18.5
11	21.5	18.5	20.5	26.0	24.0	24.5	21.0	17.5	19.5	21.5	19.5	20.0
12	24.0	19.5	22.0	25.5	23.0	24.0	21.0	18.0	19.5	20.0	17.5	19.0
13	23.0	20.5	21.5	28.0	23.5	25.5	20.5	19.0	19.5	21.0	18.0	19.5
14	21.0	19.5	20.5	25.5	23.0	24.0	21.5	19.5	20.5	20.5	18.5	19.5
15	20.5	19.0	19.5	22.5	21.0	22.0	22.0	19.5	21.0	18.5	15.5	17.0
16	20.5	17.5	19.0	22.5	21.5	22.0	21.0	17.5	19.5	16.0	14.0	15.0
17	20.0	16.5	18.0	25.0	20.5	22.5	20.5	16.5	18.5	14.5	12.5	13.5
18	20.0	17.5	18.5	26.0	21.0	23.5	20.0	17.5	19.0	13.5	11.5	12.5
19	19.5	17.0	18.5	27.0	22.5	24.5	21.0	18.0	19.5	16.0	12.0	13.5
20	18.5	16.5	17.0	26.0	21.5	24.0	21.5	18.5	20.0	14.0	11.5	12.5
21	17.5	16.0	16.5	22.0	18.5	20.5	22.5	19.0	20.5	12.5	11.0	12.0
22	17.5	16.0	17.0	21.5	17.5	19.5	21.5	19.5	20.5	12.5	9.0	10.5
23	19.5	15.0	17.0	21.5	17.0	19.5	24.0	20.0	22.0	12.5	9.0	10.5
24	20.0	16.5	18.0	21.5	18.5	20.0	25.5	22.0	23.5	13.5	11.0	12.0
25	21.0	17.0	19.0	23.0	20.0	21.5	23.5	21.0	22.0	14.0	12.5	13.5
26	21.5	16.0	19.0	22.0	19.0	20.5	22.0	20.0	21.0	15.0	13.5	14.0
27	22.0	17.5	20.0	20.5	17.0	19.0	20.5	19.0	19.5	14.0	10.5	12.5
28	21.0	18.0	19.0	20.5	18.0	19.5	19.5	18.0	19.0	12.5	9.0	10.5
29	21.5	18.0	19.5	22.5	17.5	20.0	20.0	19.0	19.5	12.0	10.5	11.0
30	22.5	18.0	20.5	22.5	20.0	21.5	22.0	20.0	20.5	11.0	9.5	10.0
31	---	---	---	24.5	20.5	22.5	23.0	20.5	21.5	---	---	---
MONTH	24.0	15.0	19.0	28.5	17.0	22.5	25.5	16.5	20.5	22.0	9.0	15.0

04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE¼ SE¼ sec.11, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft (12 m) upstream from highway bridge, 1.0 mi (1.6 km) upstream from Paint River, 2.5 mi (4.0 km) north of Florence, and 5.0 mi (8.0 km) upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi² (1,008 km²).

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft (365.928 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft (12 m) downstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Discharge includes some mine pumpage prior to August 1977. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years (water years 1915, 1945-81), 359 ft³/s (10.17 m³/s), 12.53 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft³/s (133 m³/s) July 2, 1953, gage height, 6.57 ft (2.003 m); maximum gage height, 8.27 ft (2.521 m) Dec. 26, 1969, backwater from ice; minimum discharge, 118 ft³/s (3.34 m³/s) Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft (0.546 m) July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,090 ft³/s (59.2 m³/s) June 16, gage height, 4.44 ft (1.353 m); maximum gage height, 6.59 ft (2.009 m) Dec. 4, backwater from ice; minimum daily discharge, 245 ft³/s (6.94 m³/s) Feb. 11-13; minimum gage height, 2.09 ft (0.637 m) Sept. 15, 16, 20, 21, 22, 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	439	342	310	280	260	340	839	543	359	797	306	305
2	420	333	300	280	255	310	752	545	382	630	337	291
3	445	326	270	275	255	300	694	537	492	536	326	281
4	450	326	280	270	255	300	1010	775	460	493	387	275
5	418	319	300	270	255	300	1370	1100	428	468	367	276
6	391	315	320	270	255	300	1320	1330	400	435	341	276
7	373	314	350	270	255	300	1000	1230	373	410	428	317
8	357	315	350	270	250	300	841	926	365	387	437	382
9	344	343	320	270	250	300	747	745	358	416	423	339
10	340	358	300	270	250	305	669	653	346	470	427	305
11	330	326	270	270	245	305	647	586	342	437	381	290
12	329	328	290	270	245	310	607	539	343	402	347	276
13	324	355	300	265	245	310	564	501	338	389	330	272
14	317	372	300	265	250	310	553	472	1100	372	338	261
15	313	356	290	265	255	310	525	453	1800	365	322	253
16	311	339	290	265	265	305	500	445	2030	361	323	254
17	323	331	290	265	290	300	474	423	1620	361	308	260
18	337	332	290	265	320	290	453	403	1080	436	289	263
19	329	310	290	265	340	280	433	392	784	432	282	261
20	321	319	290	265	350	270	418	383	670	408	278	255
21	314	324	290	260	360	275	397	377	720	539	281	253
22	308	314	290	260	420	275	385	364	776	482	271	253
23	305	312	290	260	480	291	611	356	825	404	268	253
24	330	315	290	270	500	301	967	380	771	376	267	253
25	477	302	290	270	470	315	940	414	699	371	280	257
26	500	350	290	270	430	346	773	420	600	374	304	264
27	441	340	285	270	410	358	656	422	532	356	289	267
28	397	350	285	265	380	419	591	390	493	335	274	269
29	371	320	285	260	---	574	548	385	883	325	297	281
30	351	300	285	260	---	759	515	388	1000	316	339	292
31	346	---	285	260	---	874	---	376	---	306	334	---
TOTAL	11351	9886	9165	8290	8795	10832	20799	17253	21364	13189	10181	8334
MEAN	366	330	296	267	314	349	693	557	712	425	328	278
MAX	500	372	350	280	500	874	1370	1330	2030	797	437	382
MIN	305	300	270	260	245	270	385	356	338	306	267	253
CFSM	.94	.85	.76	.69	.81	.90	1.78	1.43	1.83	1.09	.84	.72
IN.	1.09	.95	.88	.79	.84	1.04	1.99	1.65	2.04	1.26	.97	.80

CAL YR 1980 TOTAL 129364 MEAN 353 MAX 1370 MIN 206 CFSM .91 IN 12.37
WTR YR 1981 TOTAL 149439 MEAN 409 MAX 2030 MIN 245 CFSM 1.05 IN 14.29

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE¼ sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft (46 m) downstream from municipal powerplant at Crystal Falls, and 14.5 mi (23.3 km) upstream from mouth.

DRAINAGE AREA.--597 mi² (1,545 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft (398.10 m), Wisconsin Electric Power Co. datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 595 ft³/s (16.85 m³/s), 13.53 in/yr (344 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft³/s (309 m³/s) Apr. 25, 1960, gage height, 9.82 ft (2.993 m); minimum, 7.7 ft³/s (0.22 m³/s) Sept. 17, 1950, gage height, 0.89 ft (0.271 m); minimum daily, 81 ft³/s (2.29 m³/s) Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,280 ft³/s (121 m³/s) May 6, gage height, 6.04 ft (1.841 m); minimum, 132 ft³/s (3.74 m³/s) Sept. 21, gage height, 1.75 ft (0.533 m); minimum daily, 271 ft³/s (7.67 m³/s) Sept. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	928	658	418	367	337	587	2550	1230	535	1060	437	369
2	837	639	354	375	343	556	2630	1140	520	868	552	369
3	802	611	301	367	337	487	2640	1080	618	746	626	360
4	769	589	366	379	324	504	3340	1620	642	681	623	342
5	714	572	434	370	318	520	3940	3180	630	634	591	346
6	670	554	460	368	312	476	3390	4180	556	609	564	307
7	620	535	463	364	313	482	2790	3460	530	537	721	356
8	590	536	456	365	318	476	2510	2610	510	478	1140	436
9	548	575	438	363	317	465	2270	2100	459	410	1070	450
10	519	602	379	364	324	450	2060	1760	477	460	866	396
11	504	539	315	374	327	450	2030	1510	515	390	766	387
12	516	542	377	366	332	445	1950	1270	500	423	699	338
13	534	619	410	357	303	441	1850	1100	482	387	634	328
14	538	629	389	359	321	428	1740	963	2240	380	604	346
15	538	612	374	363	323	440	1580	864	3530	387	578	328
16	525	581	387	357	337	411	1400	786	2950	372	565	324
17	525	560	385	353	373	420	1270	730	2210	375	547	307
18	533	527	379	358	447	412	1160	681	1640	375	518	324
19	525	477	370	364	473	392	1090	636	1330	379	452	311
20	514	508	348	357	499	393	1010	600	1180	393	432	303
21	510	519	352	355	493	401	918	550	1300	836	424	291
22	498	489	348	356	493	409	837	515	1500	923	380	307
23	505	510	370	356	625	432	1170	530	1880	751	383	271
24	554	501	388	352	707	462	2410	510	1870	651	357	279
25	771	425	379	367	707	504	2520	556	1890	619	351	279
26	1020	436	384	368	692	561	2220	578	1690	922	351	279
27	973	422	379	370	615	627	1930	618	1430	857	338	315
28	898	474	379	355	594	707	1700	572	1180	727	362	324
29	833	451	379	341	---	1260	1530	589	1340	612	324	307
30	768	444	374	347	---	2080	1360	589	1280	519	362	315
31	702	---	370	326	---	2490	---	545	---	458	416	---
TOTAL	20281	16136	11905	11183	11904	19168	59795	37652	37414	18219	17013	9994
MEAN	654	538	384	361	425	618	1993	1215	1247	588	549	333
MAX	1020	658	463	379	707	2490	3940	4180	3530	1060	1140	450
MIN	498	422	301	326	303	392	837	510	459	372	324	271
CFSM	1.10	.90	.64	.61	.71	1.04	3.34	2.04	2.09	.99	.92	.56
IN.	1.26	1.01	.74	.70	.74	1.19	3.73	2.35	2.33	1.14	1.06	.62

CAL YR 1980 TOTAL 218852 MEAN 598 MAX 3150 MIN 265 CFSM 1.00 IN 13.64
WTR YR 1981 TOTAL 270664 MEAN 742 MAX 4180 MIN 271 CFSM 1.24 IN 16.87

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW¼ NW¼ sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi (1.0 km) downstream from Lower Paint Dam, 5.5 mi (8.8 km) upstream from Brule River, and 6.0 mi (9.7 km) southeast of Alpha.

DRAINAGE AREA.--631 mi^2 (1,634 km^2).

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft (384 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage-height record, Dec. 30 to Feb. 25, which are fair. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi (1.0 km) upstream. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 173 ft^3/s (4.899 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft^3/s (228 m^3/s) July 2, 1953, gage height, 10.50 ft (3.200 m); minimum daily, 62 ft^3/s (1.76 m^3/s) Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,060 ft^3/s (86.7 m^3/s) May 6, 7, gage height, 7.43 ft (2.265 m); minimum daily, 83 ft^3/s (2.35 m^3/s) May 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	178	90	88	92	101	219	89	88	613	97	92
2	90	178	90	88	92	100	370	88	90	313	97	92
3	90	162	90	88	92	98	642	89	91	92	98	92
4	90	88	90	88	92	96	1020	588	89	92	100	92
5	90	90	90	88	92	96	1800	1970	88	92	97	92
6	90	90	90	88	92	96	1430	3030	88	93	100	92
7	90	88	90	88	92	96	615	2990	88	93	117	93
8	90	90	90	88	92	94	259	2660	88	92	97	92
9	90	90	88	88	92	94	155	1700	88	92	98	90
10	91	90	88	88	92	92	97	586	88	92	98	90
11	91	90	88	90	92	92	91	85	88	92	97	91
12	90	91	88	90	92	90	90	84	86	92	97	92
13	140	90	88	90	92	90	90	84	88	96	97	92
14	189	90	88	90	92	90	91	83	132	93	97	92
15	189	90	88	90	92	90	90	90	1380	93	96	92
16	189	90	88	90	92	90	90	88	1760	98	95	91
17	188	90	88	90	94	90	89	88	1640	100	95	90
18	187	90	88	90	96	90	88	88	1070	95	96	90
19	187	89	88	90	100	90	88	88	377	95	97	90
20	189	88	88	90	105	88	88	88	90	95	97	90
21	189	89	88	90	105	88	88	88	91	95	97	90
22	189	89	88	90	105	88	88	88	279	96	97	90
23	189	89	88	90	105	86	295	88	1130	95	97	90
24	190	90	88	90	110	86	1250	91	1440	95	95	90
25	192	90	88	92	110	87	1490	91	1450	95	95	90
26	192	89	88	92	108	86	1460	90	1070	96	95	90
27	192	89	88	92	106	87	1420	89	628	97	93	90
28	189	90	88	92	102	88	1370	88	342	97	93	88
29	187	90	88	92	---	90	1070	88	361	97	93	88
30	185	90	88	92	---	252	450	88	629	97	92	88
31	182	---	88	92	---	176	---	88	---	97	93	---
TOTAL	4618	2937	2744	2784	2718	3077	16483	15633	15017	3670	3003	2721
MEAN	149	97.9	88.5	89.8	97.1	99.3	549	504	501	118	96.9	90.7
MAX	192	178	90	92	110	252	1800	3030	1760	613	117	93
MIN	90	88	88	88	92	86	88	83	86	92	92	88

CAL YR 1980 TOTAL 43190 MEAN 118 MAX 1930 MIN 80
WTR YR 1981 TOTAL 75405 MEAN 207 MAX 3030 MIN 83

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI

LOCATION.--Lat 46°28'00", long 88°04'28", in SW¼ SW¼ sec.16, T.47 N., R.30 W., Marquette County, Hydrologic Unit 04030107, on right bank 20 ft (6 m) upstream from Northern Natural Gas Co. pipeline, 0.6 mi (1.0 km) upstream from Spruce River, 1.2 mi (1.9 km) downstream from Lake Michigamme, and 5.0 mi (8.0 km) southeast of Michigamme.

DRAINAGE AREA.--194 mi^2 (502 km^2).

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,520 ft (463 m) from topographic map (nearest 10 ft).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 286 ft^3/s (8.100 m^3/s), 20.02 in/yr (509 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,180 ft^3/s (90.1 m^3/s) Apr. 19, 1976, gage height, 7.77 ft (2.368 m); minimum, 2.8 ft^3/s (0.079 m^3/s) Sept. 30, 1976, gage height, 1.56 ft (0.475 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,450 ft^3/s (41.1 m^3/s) Apr. 15, gage height, 6.13 ft (1.868 m); minimum, 59 ft^3/s (1.67 m^3/s) Sept. 30, gage height, 2.64 ft (0.805 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	645	364	189	131	94	163	366	716	235	323	74	75
2	595	349	185	130	94	172	514	646	229	303	74	73
3	535	340	179	127	94	179	716	610	242	287	77	71
4	490	331	175	125	93	189	912	626	247	274	79	70
5	446	316	171	123	91	190	1040	732	248	259	75	68
6	414	305	169	121	91	190	1090	819	249	242	75	66
7	382	298	167	121	91	188	1130	871	242	225	81	66
8	361	290	167	117	91	190	1130	869	257	210	90	67
9	334	292	165	116	90	189	1120	841	277	203	105	65
10	313	288	165	115	89	186	1130	797	286	184	122	65
11	302	279	162	113	88	183	1230	733	288	169	131	67
12	295	277	159	112	87	183	1350	665	290	158	135	68
13	292	279	159	111	86	181	1400	603	287	150	136	67
14	295	277	158	108	85	176	1430	551	310	138	133	66
15	298	271	155	108	83	173	1440	507	397	128	130	65
16	298	265	154	109	83	170	1410	466	602	120	121	64
17	298	261	153	108	82	171	1350	429	741	115	112	64
18	302	255	156	107	82	169	1300	397	777	109	107	64
19	305	249	156	106	82	168	1240	375	758	102	102	64
20	305	243	152	105	83	164	1170	350	716	101	97	64
21	308	239	150	103	85	160	1080	330	666	100	94	63
22	305	231	149	100	90	157	995	308	627	94	90	63
23	302	227	146	100	100	154	970	290	576	91	89	62
24	305	225	146	99	113	152	970	281	536	88	86	62
25	328	215	142	97	122	150	957	274	500	89	83	62
26	358	209	140	97	131	149	934	276	456	87	83	62
27	382	203	137	97	141	150	907	271	418	84	82	61
28	402	199	135	96	154	157	862	263	382	82	78	60
29	398	195	133	96	---	181	810	257	369	79	76	60
30	390	193	131	95	---	228	760	255	349	76	76	60
31	378	---	131	94	---	281	---	243	---	73	75	---
TOTAL	11361	7965	4836	3387	2695	5493	31713	15651	12557	4743	2968	1954
MEAN	366	266	156	109	96.3	177	1057	505	419	153	95.7	65.1
MAX	645	364	189	131	154	281	1440	871	777	323	136	75
MIN	292	193	131	94	82	149	366	243	229	73	74	60
CFSM	1.89	1.37	.80	.56	.50	.91	5.45	2.60	2.16	.79	.49	.34
IN.	2.18	1.53	.93	.65	.52	1.05	6.08	3.00	2.41	.91	.57	.37

CAL YR 1980 TOTAL 91258 MEAN 249 MAX 1410 MIN 76 CFSM 1.28 IN 17.50
WTR YR 1981 TOTAL 105323 MEAN 289 MAX 1440 MIN 60 CFSM 1.49 IN 20.20

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW¼ sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft (122 m) upstream from highway bridge, 5.0 mi (8.0 km) downstream from Michigamme Reservoir, 6.0 mi (9.7 km) east of Crystal Falls and 15 mi (24 km) upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi^2 (1,699 km^2).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft (396 m) from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm^3), 5 mi (8 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 703 ft^3/s (19.91 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft^3/s (206 m^3/s) Apr. 28, 1960, gage height 10.73 ft (3.271 m); minimum daily, 71 ft^3/s (2.01 m^3/s) Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,790 ft^3/s (107 m^3/s) June 15, gage height, 8.03 ft (2.448 m); minimum, 109 ft^3/s (3.09 m^3/s) Sept. 18, gage height, 1.59 ft (0.485 m); minimum daily, 135 ft^3/s (3.82 m^3/s) Sept. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1600	684	950	641	1120	153	162	1160	682	1590	684	598
2	1480	685	1160	638	625	153	153	1180	718	1380	686	595
3	1310	691	833	637	516	157	153	1190	794	1160	682	595
4	1300	685	569	636	1140	149	190	1450	991	941	686	593
5	1160	631	566	945	1130	650	162	2180	1170	694	683	590
6	931	574	566	1150	1080	1090	141	2720	939	691	690	590
7	687	627	566	1150	1040	1040	141	2660	705	688	706	603
8	686	686	840	1140	1030	1050	147	2630	936	687	699	350
9	683	692	1150	1140	1040	1040	148	2140	1130	684	708	166
10	685	688	1160	1130	1050	1030	146	1640	1150	682	745	156
11	683	688	1160	1130	1030	1000	144	1410	1180	679	741	156
12	683	692	919	1140	1010	1000	139	1180	919	680	981	154
13	683	696	660	1150	984	989	143	1180	689	678	1200	154
14	682	696	659	1140	944	1050	152	1170	1460	674	1190	416
15	681	693	942	1140	909	1010	148	1170	2900	674	1180	585
16	679	690	1170	1130	963	872	372	944	3440	673	1170	585
17	682	918	1180	1130	966	1060	564	689	2600	517	1180	585
18	681	1120	1190	1120	894	717	560	685	1550	195	1200	472
19	679	1120	1070	1140	800	545	565	623	1340	186	1190	145
20	680	907	650	1160	398	404	831	569	1190	504	1190	149
21	681	675	648	1150	143	148	1150	567	1200	692	926	404
22	681	681	918	1140	144	138	1160	567	1240	496	665	583
23	682	683	1130	1140	146	645	1210	566	1710	174	663	582
24	500	681	1010	1130	145	1070	1200	576	2110	385	660	582
25	145	917	642	1130	146	825	1200	586	2090	711	660	434
26	144	1140	644	1150	148	707	1160	627	1610	697	657	139
27	537	1150	641	1160	151	377	1390	692	1160	687	611	135
28	1110	882	642	1160	153	150	1590	688	1150	683	602	396
29	1110	675	916	1150	---	173	1590	690	1440	680	601	582
30	1100	673	1130	1140	---	177	1340	685	1610	678	599	583
31	865	---	1020	1130	---	165	---	682	---	679	599	---
TOTAL	24890	23020	27301	33167	19845	19734	18151	35496	41803	21219	25434	12657
MEAN	803	767	881	1070	709	637	605	1145	1393	684	820	422
MAX	1600	1150	1190	1160	1140	1090	1590	2720	3440	1590	1200	603
MIN	144	574	566	636	143	138	139	566	682	174	599	135

CAL YR 1980 TOTAL 241255 MEAN 659 MAX 1600 MIN 130
WTR YR 1981 TOTAL 302717 MEAN 829 MAX 3440 MIN 135

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE¼ sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi (0.8 km) downstream from confluence of Brule and Michigamme Rivers, 3.5 mi (5.6 km) northeast of Florence, and at mile 117 (188 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²).

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953(M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft (341.141 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi (16.7 km) downstream.

REMARKS.--Records excellent. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--67 years, 1,804 ft³/s (51.09 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft³/s (552 m³/s) Apr. 26, 1960, gage height, 14.15 ft (4.313 m); minimum, 38 ft³/s (1.08 m³/s) Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft (0.360 m) Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft³/s (1.61 m³/s) Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,600 ft³/s (357 m³/s) June 15, gage height, 10.89 ft (3.319 m); minimum, 220 ft³/s (6.23 m³/s) Sept. 17, gage height, 1.87 ft (0.570 m); minimum daily, 668 ft³/s (18.9 m³/s) Sept. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2920	1660	1660	1610	1910	2090	1980	2550	1890	3770	1740	964
2	3010	1630	1900	1680	1980	1970	2540	2480	1900	3610	1770	1650
3	3120	1870	1420	1720	2100	2250	3470	2810	2350	2560	1810	1640
4	3080	1420	1490	1970	1880	2060	4570	4060	2550	2360	2120	1430
5	3000	1570	1700	1730	1910	2290	6000	5990	2300	1800	2120	1210
6	2570	1460	1500	1680	2140	2350	5730	8120	2310	2020	2050	1250
7	1710	1620	1380	1760	1840	1880	4610	8820	2030	2110	1990	984
8	1510	1410	1700	1720	1870	2090	3720	8420	2270	1960	2450	2030
9	1630	1060	1800	1720	2030	1970	2770	6620	2520	1910	2430	1420
10	1510	1590	1810	1930	1890	1800	2790	4440	2030	1620	3210	1120
11	1590	1610	1920	2090	2060	1930	2950	2760	1930	1460	2750	1320
12	1700	2080	1890	1910	2020	1940	2620	2900	2110	1530	2390	677
13	1770	2470	1810	1940	2020	1910	2580	2880	1960	1760	2670	920
14	1590	2400	1600	1710	1980	1860	2640	2950	3790	1560	2560	1260
15	1620	2220	1780	2110	1940	1780	2680	2860	9840	1690	1900	1230
16	2050	2020	1910	2050	1910	1960	2820	2480	10300	1730	2120	1340
17	1890	2470	2010	1680	2070	1890	2820	2230	7720	1280	2110	1180
18	1660	2380	1910	1680	1810	1680	2580	1820	4730	1200	1850	1260
19	1720	2410	2090	1840	1800	1450	1950	1630	3410	1150	1770	808
20	1790	1930	1140	1780	2000	1390	2050	1530	3030	1530	1850	925
21	1470	1590	1440	1900	1850	720	2230	1520	3140	1850	1570	1440
22	1830	1340	1710	1970	1630	815	2350	1510	3500	2160	1230	1050
23	1620	1330	1780	1980	1730	1240	2880	1470	4690	1750	925	1330
24	1460	1440	1860	1760	1750	907	4880	1750	4910	2070	1590	1490
25	1870	1760	1500	1950	2050	912	5360	1740	4550	1610	1420	1160
26	1820	1820	1610	1840	1910	844	4970	1850	4270	2000	1380	769
27	2380	1530	1420	2020	2100	671	4770	1650	3670	1970	1490	668
28	2840	1590	1330	1910	2230	1000	4580	1860	3420	2100	1420	1210
29	3090	1570	1700	1920	---	962	4220	2090	3540	1850	1540	1200
30	2880	1420	1810	2080	---	1330	3470	2100	4230	1940	1150	1230
31	2520	---	1520	2040	---	1700	---	2040	---	1690	1640	---
TOTAL	65220	52670	52100	57680	54410	49641	103580	97930	110890	59600	59015	36165
MEAN	2104	1756	1681	1861	1943	1601	3453	3159	3696	1923	1904	1206
MAX	3120	2470	2090	2110	2230	2350	6000	8820	10300	3770	3210	2030
MIN	1460	1060	1140	1610	1630	671	1950	1470	1890	1150	925	668

CAL YR 1980 TOTAL 653517 MEAN 1786 MAX 5740 MIN 561
WTR YR 1981 TOTAL 798901 MEAN 2189 MAX 10300 MIN 668

04065300 WEST BRANCH STURGEON RIVER NEAR RANDVILLE, MI

LOCATION.--Lat 46°00'45", long 87°58'41", in NE¼ sec.30, T.42 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on right bank 500 ft (152 m) downstream from county highway bridge, 3.0 mi (4.8 km) downstream from Tom Kings Creek, and 4.0 mi (6.4 km) northeast of Randville.

DRAINAGE AREA.--56.1 mi^2 (145.3 km^2).

PERIOD OF RECORD.--August 1958 to September 1981 (discontinued).

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Sharp-crested weir since Aug. 6, 1976. Altitude of gage is 1,170 ft (357 m) from topographic map (nearest 10 ft).

REMARKS.--Records fair. From December 1958 to February 1981, diversion above station for industrial use; figures of runoff adjusted. Small diversions for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 43.8 ft^3/s (1.240 m^3/s), 10.60 in/yr (269 mm/yr), adjusted for diversion December 1958 to February 1981.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 610 ft^3/s (17.3 m^3/s) June 15, 1981, gage height, 6.64 ft (2.024 m); minimum, 1.5 ft^3/s (0.042 m^3/s) July 22, 1964, gage height, 1.35 ft (0.411 m); minimum daily, 3.4 ft^3/s (0.096 m^3/s) July 22, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 610 ft^3/s (17.3 m^3/s) June 15, gage height, 6.64 ft (2.024 m); minimum, 9.6 ft^3/s (0.27 m^3/s) Dec. 2, gage height, 3.55 ft (1.082 m), result of freezeup; minimum daily, 11 ft^3/s (0.31 m^3/s) Jan. 12, 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	27	16	12	15	62	125	66	25	96	15	30
2	37	26	16	12	15	45	114	64	27	58	20	27
3	36	25	17	12	14	38	100	68	41	45	24	23
4	35	25	17	12	14	37	149	116	49	38	66	20
5	31	23	17	12	14	32	268	230	39	34	75	19
6	24	22	19	12	14	35	213	307	31	27	47	19
7	25	22	22	12	14	38	127	215	25	23	66	31
8	24	21	24	12	14	29	108	129	25	21	64	72
9	23	26	21	12	14	26	100	94	28	19	48	66
10	22	31	19	12	14	26	98	79	24	16	76	44
11	22	26	17	12	14	26	88	68	23	15	69	35
12	22	24	15	11	14	29	84	60	22	15	50	28
13	22	32	15	11	14	32	76	53	21	15	37	23
14	21	41	14	12	14	29	88	47	129	14	34	21
15	21	38	13	12	14	33	90	43	519	15	30	19
16	24	33	13	12	15	33	74	40	510	15	26	17
17	28	30	13	13	16	29	68	37	285	16	21	18
18	31	27	14	19	18	24	66	34	130	28	19	19
19	31	24	13	21	22	22	60	32	74	25	17	17
20	29	24	13	20	27	21	58	29	60	46	16	18
21	28	24	12	20	32	19	50	30	62	74	17	19
22	25	23	12	21	48	20	48	26	70	49	14	19
23	26	24	12	21	84	24	86	25	79	30	15	18
24	26	24	12	20	108	31	188	33	78	25	14	20
25	58	19	12	21	106	36	213	37	88	25	13	21
26	70	21	12	21	78	47	138	40	68	31	26	23
27	58	18	12	20	60	52	102	41	48	24	51	22
28	43	19	12	19	66	66	86	32	41	20	37	20
29	35	19	12	19	---	102	80	35	99	18	29	21
30	30	19	12	17	---	136	70	33	128	15	40	22
31	29	---	12	15	---	142	---	27	---	15	39	---
TOTAL	984	757	462	477	892	1321	3205	2170	2848	907	1115	771
MEAN	31.7	25.2	14.9	15.4	31.9	42.6	107	70.0	94.9	29.3	36.0	25.7
MAX	70	41	24	21	108	142	268	307	519	96	76	72
MIN	21	18	12	11	14	19	48	25	21	14	13	17
†	4.8	5.5	5.8	5.4	.8	0	0	0	0	0	0	0
MEAN‡	36.5	30.7	20.7	20.8	32.7	42.6	107	70.0	94.9	29.3	36.0	25.7
CFSM‡	.65	.55	.37	.37	.58	.76	1.91	1.25	1.69	.52	.64	.46
IN‡	.75	.61	.43	.43	.61	.88	2.13	1.44	1.89	.60	.74	.51

CAL YR 1980 TOTAL 12193.4 MEAN 33.3 MAX 306 MIN 7.7 MEAN‡ 38.8 CFSM‡ .69 IN‡ 9.42
WTR YR 1981 TOTAL 15909.0 MEAN 43.6 MAX 519 MIN 11 MEAN‡ 45.5 CFSM‡ .81 IN‡ 11.01

† Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.
‡ Adjusted for diversion.

04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW¼ NE¼ sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic 04030108, on right bank 50 ft (15 m) downstream from Skunk Creek, and 2.2 mi (3.5 km) north of Felch.

DRAINAGE AREA.--61.8 mi² (160.1 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,067.53 ft (325.383 m) National Geodetic Vertical Datum of 1929. Sept. 20, 1972 to Dec. 20, 1973, nonrecording gage, and Dec. 20, 1973 to Sept. 30, 1980, water-stage recorder at present site at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir, usable capacity, 3,990 acre-ft (4.92 hm³) 3 mi (5 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--8 years, 55.0 ft³/s (1.558 m³/s), 12.09 in/yr (307 mm/yr), adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 628 ft³/s (17.8 m³/s) Apr. 26, 1979, gage height, 6.28 ft (1.914 m), present datum; minimum, 3.4 ft³/s (0.096 m³/s) Sept. 7, 8, 9, 13, 1976, July 7, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 438 ft³/s (12.4 m³/s) June 16, gage height, 6.13 ft (1.868 m); minimum, 12 ft³/s (0.340 m³/s) Sept. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	42	29	17	16	54	129	85	34	116	38	20
2	61	41	28	17	16	50	126	76	34	99	47	19
3	58	39	27	17	16	48	120	78	43	83	50	18
4	54	39	26	17	16	46	173	118	44	71	133	17
5	49	37	26	17	16	44	254	183	39	71	160	17
6	46	37	26	17	15	42	244	235	36	57	134	17
7	44	36	25	17	15	39	200	213	32	48	120	19
8	42	37	25	17	15	35	166	170	33	43	110	27
9	40	39	25	17	16	34	142	138	32	39	97	26
10	39	39	24	17	16	33	126	116	31	35	90	24
11	38	38	24	17	16	33	116	98	29	31	87	22
12	36	38	24	17	16	33	110	83	28	29	79	21
13	35	44	24	17	16	34	106	72	28	28	69	20
14	34	48	24	17	17	34	118	64	117	26	62	18
15	33	48	23	17	18	34	120	57	321	25	57	17
16	32	47	22	18	19	33	104	52	421	24	51	16
17	34	45	22	18	21	33	94	48	350	26	45	15
18	35	43	21	18	25	31	87	44	244	40	40	16
19	35	41	20	18	30	30	81	42	156	38	37	14
20	35	40	20	18	35	29	76	38	119	61	34	14
21	35	38	20	18	40	28	67	37	99	144	32	13
22	35	37	20	18	50	29	63	36	87	146	29	13
23	34	37	19	18	60	31	102	34	77	115	28	13
24	35	36	19	18	74	35	153	36	82	82	27	12
25	47	36	19	18	70	38	163	38	85	80	26	13
26	52	35	19	18	66	44	141	39	74	79	26	15
27	51	35	18	17	62	48	123	38	65	65	26	16
28	49	33	18	17	58	55	111	36	62	56	26	17
29	46	32	18	17	---	75	106	39	102	49	23	16
30	44	30	18	16	---	107	95	38	122	43	22	20
31	43	---	17	16	---	123	---	35	---	39	21	---
TOTAL	1319	1167	690	536	850	1362	3816	2416	3026	1888	1826	525
MEAN	42.5	38.9	22.3	17.3	30.4	43.9	127	77.9	101	60.9	58.9	17.5
MAX	68	48	29	18	74	123	254	235	421	146	160	27
MIN	32	30	17	16	15	28	63	34	28	24	21	12
CFSM	.69	.63	.36	.28	.49	.71	2.06	1.26	1.63	.99	.95	.28
IN.	.79	.70	.42	.32	.51	.82	2.30	1.45	1.82	1.14	1.10	.32

CAL YR 1980 TOTAL 16166.4 MEAN 44.2 MAX 381 MIN 4.0 CFSM .72 IN 9.73
WTR YR 1981 TOTAL 19421.0 MEAN 53.2 MAX 421 MIN 12 CFSM .86 IN 11.69

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI

LOCATION.--Lat 45°57'55", long 87°41'53", in SW¼ NW¼ sec.9, T.41 N., R.27 W., Dickinson County, Hydrologic Unit 04030108, on right bank 10 ft (3 m) downstream from bridge on county highway, at Hardwood, 350 ft (107 m) upstream from Schultz Creek, and 9 mi (14 km) upstream from confluence with West Branch.

DRAINAGE AREA.--90.8 mi² (235.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972-77. October 1977 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,030 ft (314 m) from topographic map (nearest 10 ft). Sept. 20, 1972 to Sept. 30, 1977, non-recording gage at site 1 mi (2 km) upstream at different datum. Oct. 1-20, 1977, non-recording gage at present site and datum.

REMARKS.--Water-discharge records good. Occasional regulation during low flows by Gene Lake Reservoir in headwaters (station 04065393) and Hardwood Reservoir 1.2 mi (1.9 km) upstream, combined usable capacity, 11,180 acre-ft (13.8 hm³).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 869 ft³/s (24.6 m³/s) Apr. 27, 1979, gage height, 8.44 ft (2.573 m); minimum 3.4 ft³/s (0.096 m³/s) Aug. 14, 1980, gage height, 2.67 ft (0.814 m), result of unusual regulation at Hardwood Reservoir; minimum daily, 4.0 ft³/s (0.11 m³/s) Oct. 31, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 480 ft³/s (13.6 m³/s) June 17, gage height, 6.80 ft (2.073 m); minimum, 15 ft³/s (0.42 m³/s) Sept. 22, 23, 24, 25, 27, gage height, 3.03 ft (0.924 m); minimum daily, 16 ft³/s (0.45 m³/s) Sept. 22-28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	135	54	40	26	26	97	177	151	49	141	66	42
2	115	53	39	26	26	93	184	134	48	143	87	42
3	98	49	38	26	26	88	190	141	54	139	86	42
4	84	48	36	26	26	81	258	163	57	138	132	42
5	75	46	35	26	26	74	285	198	58	131	152	42
6	65	47	34	25	26	66	299	230	55	113	182	41
7	60	48	33	25	26	60	304	262	51	97	221	42
8	58	43	33	25	26	58	292	274	50	83	218	41
9	51	48	32	25	26	57	257	256	50	73	191	41
10	46	48	32	25	26	55	230	220	48	59	177	41
11	46	46	32	25	26	53	223	190	46	51	164	41
12	42	49	33	24	26	54	199	161	46	48	145	41
13	40	55	33	24	26	55	181	141	48	46	129	41
14	39	55	33	24	26	52	187	122	145	44	118	41
15	37	54	33	24	26	54	176	108	248	43	111	40
16	35	53	32	24	26	52	175	97	336	43	96	40
17	40	52	31	24	27	54	170	88	438	47	82	40
18	37	51	30	24	28	51	155	81	450	48	70	40
19	36	46	28	24	30	47	148	75	391	46	62	40
20	35	45	27	24	31	47	136	66	320	67	54	41
21	37	46	26	24	33	46	123	59	244	123	50	32
22	37	43	26	25	43	48	119	54	195	152	50	16
23	37	42	26	25	64	52	174	52	157	180	48	16
24	39	42	26	25	70	55	200	51	143	189	46	16
25	47	42	26	25	72	66	220	50	128	179	44	16
26	54	42	26	26	77	86	225	51	116	145	43	16
27	57	42	26	26	88	86	215	50	106	121	43	16
28	59	41	26	26	99	93	198	49	96	105	42	16
29	59	41	26	26	---	114	180	52	126	89	43	17
30	60	41	26	26	---	141	164	52	132	77	43	17
31	57	---	26	26	---	157	---	50	---	67	42	---
TOTAL	1717	1412	950	776	1078	2192	6044	3728	4431	3027	3037	999
MEAN	55.4	47.1	30.6	25.0	38.5	70.7	201	120	148	97.6	98.0	33.3
MAX	135	55	40	26	99	157	304	274	450	189	221	42
MIN	35	41	26	24	26	46	119	49	46	43	42	16
CFSM	.61	.52	.34	.28	.42	.78	2.21	1.32	1.63	1.08	1.08	.37
IN.	.70	.58	.39	.32	.44	.90	2.48	1.53	1.82	1.24	1.24	.41

CAL YR 1980 TOTAL 21435.3 MEAN 58.6 MAX 384 MIN 9.3 CFSM .65 IN 8.78
WTR YR 1981 TOTAL 29391.0 MEAN 80.5 MAX 450 MIN 16 CFSM .89 IN 12.04

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: December 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum recorded, 28.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 24.5°C Aug. 5; minimum, 0.0°C Jan. 3.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	12.0	10.5	11.5	5.0	4.0	4.5	4.0	2.5	3.0	3.0	1.5	2.0
2	11.5	11.0	11.5	5.0	4.0	4.5	3.0	2.0	2.5	2.0	.5	1.5
3	10.5	10.5	10.5	5.0	4.0	4.5	3.5	2.0	2.5	1.5	.0	.5
4	10.0	9.5	10.0	5.0	4.0	4.5	3.0	3.0	3.0	2.0	.5	1.0
5	10.0	8.5	9.5	5.0	3.5	4.0	3.0	2.5	3.0	2.0	.5	1.5
6	10.0	8.5	9.0	5.5	4.0	4.5	2.5	2.0	2.0	3.0	1.0	2.0
7	10.5	8.5	9.5	4.5	3.5	4.0	2.5	2.0	2.0	2.0	.5	1.0
8	11.0	8.5	9.5	4.0	2.5	3.5	2.5	2.0	2.0	2.5	.5	1.5
9	11.5	9.0	10.0	3.5	3.0	3.5	3.5	2.5	2.5	2.0	.5	1.5
10	11.5	9.5	10.0	3.5	2.5	3.0	2.5	2.0	2.0	2.0	.5	1.0
11	10.0	8.5	9.0	3.5	2.0	2.5	3.0	1.5	2.0	2.0	.5	1.0
12	9.5	8.5	8.5	2.5	2.0	2.0	3.5	2.0	2.5	3.0	1.0	2.0
13	9.0	7.5	8.5	2.5	2.0	2.0	3.0	2.0	2.0	3.5	1.5	2.5
14	8.5	7.5	8.0	3.0	2.0	2.5	2.5	1.5	2.0	3.5	2.5	2.5
15	9.5	7.0	8.0	3.0	2.0	2.5	3.5	2.0	2.5	3.0	2.0	2.0
16	8.0	7.0	7.5	3.5	2.0	2.5	3.0	2.0	2.5	2.5	1.5	2.0
17	9.5	6.0	7.5	3.0	2.5	2.5	2.5	1.0	2.0	3.0	1.5	2.0
18	9.0	8.0	8.5	3.5	2.5	3.0	2.0	1.0	1.5	4.0	2.0	2.5
19	8.5	7.0	7.5	4.0	2.5	3.0	2.0	1.0	1.0	4.0	1.5	2.0
20	8.0	7.0	7.0	4.0	2.5	3.0	2.0	.5	1.0	3.0	2.0	2.5
21	8.0	6.5	7.0	4.0	3.0	3.5	2.0	.5	1.5	4.0	2.0	2.5
22	8.5	6.5	7.0	4.5	3.0	3.5	2.0	2.0	2.0	3.5	2.0	2.5
23	8.0	7.0	7.0	4.0	3.5	3.5	3.0	2.0	2.5	4.0	2.0	2.5
24	7.0	6.5	6.5	3.5	3.0	3.5	2.0	1.0	1.5	4.0	1.5	2.5
25	6.5	6.0	6.5	4.0	2.5	3.0	2.0	1.0	1.5	4.0	2.0	2.5
26	6.5	5.5	6.0	4.5	2.5	3.5	2.5	1.0	2.0	3.0	2.0	2.5
27	6.5	5.0	5.5	4.0	3.0	3.5	3.0	.5	1.5	3.5	1.0	2.0
28	6.5	4.5	5.0	4.0	3.5	3.5	3.5	2.0	2.5	2.5	1.0	1.5
29	6.0	4.0	4.5	3.5	3.0	3.5	3.5	2.0	2.5	3.0	1.0	1.5
30	5.5	4.0	4.5	4.0	2.5	3.5	2.0	1.5	2.0	3.0	.5	1.5
31	6.0	4.0	4.5	---	---	---	3.0	1.5	2.0	3.0	.5	2.0
MONTH	12.0	4.0	8.0	5.5	2.0	3.5	4.0	.5	2.0	4.0	.0	2.0

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	3.0	1.0	2.0	---	---	---	4.0	3.0	3.5	11.0	9.0	10.0
2	2.0	.5	1.0	---	---	---	5.0	3.5	4.0	11.0	9.0	10.0
3	2.0	.5	1.0	---	---	---	4.0	3.0	3.5	9.5	9.0	9.0
4	2.0	.5	1.0	---	---	---	3.5	3.0	3.5	9.5	8.5	9.0
5	3.5	1.0	2.0	2.5	1.0	1.5	4.0	3.0	3.5	11.5	9.0	10.0
6	2.5	1.0	2.0	2.5	1.0	1.5	4.5	3.0	4.0	12.5	10.0	11.0
7	2.5	.5	1.5	3.5	1.5	2.0	4.0	3.5	4.0	12.5	10.5	11.5
8	---	---	---	3.5	1.5	2.0	3.5	3.5	3.5	12.0	10.5	11.0
9	---	---	---	2.5	1.5	2.0	4.5	3.5	4.0	11.0	10.5	11.0
10	---	---	---	2.5	1.5	2.0	5.0	4.5	4.5	10.5	10.5	10.5
11	---	---	---	4.0	1.5	2.5	6.5	4.5	5.5	10.5	9.5	10.0
12	---	---	---	4.0	2.0	2.5	8.0	6.0	7.0	12.0	9.5	11.0
13	---	---	---	3.5	1.5	2.0	7.0	6.0	6.5	13.0	10.5	12.0
14	---	---	---	5.0	1.5	2.5	7.5	6.0	6.5	14.0	11.5	12.5
15	---	---	---	4.0	2.0	2.5	8.0	6.5	7.0	14.0	12.0	13.0
16	---	---	---	5.0	2.0	2.5	8.5	7.0	7.5	14.5	12.0	13.0
17	---	---	---	4.0	2.0	2.5	8.5	7.0	8.0	14.5	12.0	13.0
18	---	---	---	3.0	2.0	2.5	10.5	7.5	9.0	15.0	11.5	13.0
19	---	---	---	4.0	2.0	2.5	9.0	8.5	8.5	15.0	11.5	13.0
20	---	---	---	4.0	2.0	2.5	9.5	8.0	8.5	15.0	11.5	13.0
21	---	---	---	5.5	2.0	3.0	9.0	8.0	8.5	15.5	12.0	13.0
22	---	---	---	5.5	2.0	3.0	8.5	8.0	8.0	14.5	11.5	13.0
23	---	---	---	6.0	2.0	3.5	7.5	7.0	7.0	14.5	12.0	13.0
24	---	---	---	6.5	2.0	3.5	8.0	6.5	7.5	13.5	12.0	12.5
25	---	---	---	6.5	2.5	4.0	9.0	7.0	8.0	14.0	12.0	12.5
26	---	---	---	4.0	3.0	3.5	9.0	8.5	8.5	13.5	12.0	12.5
27	---	---	---	5.5	2.5	3.5	10.0	8.0	8.5	13.5	12.5	13.0
28	---	---	---	5.0	3.0	3.5	9.0	8.5	8.5	15.5	12.0	13.0
29	---	---	---	4.0	3.0	3.5	11.5	8.0	9.5	15.5	12.5	13.5
30	---	---	---	3.5	3.0	3.5	10.5	9.0	9.5	15.5	12.0	13.5
31	---	---	---	4.0	3.0	3.5	---	---	---	16.5	12.5	14.0
MONTH							11.5	3.0	6.5	16.5	8.5	12.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.0	12.5	13.5	---	---	---	22.0	20.0	20.5	20.5	19.0	19.5
2	16.0	13.0	14.0	---	---	---	23.0	20.5	21.0	20.5	18.5	19.5
3	17.0	14.0	15.0	---	---	---	23.0	20.5	21.5	21.5	18.0	19.0
4	18.0	14.0	16.0	---	---	---	23.5	21.5	22.0	19.5	18.0	18.5
5	18.0	14.5	16.0	---	---	---	24.5	22.0	23.0	19.0	18.0	18.5
6	17.5	14.5	15.5	---	---	---	23.0	22.5	22.5	19.0	17.5	18.0
7	17.0	14.5	15.5	---	---	---	22.5	21.5	22.0	18.0	17.5	17.5
8	17.0	15.0	15.5	---	---	---	23.5	21.0	22.0	19.0	16.5	17.5
9	17.0	14.5	15.5	---	---	---	22.0	21.0	21.5	19.5	15.5	17.0
10	18.5	15.0	16.0	---	---	---	22.0	20.5	21.0	20.0	16.5	17.5
11	18.5	15.0	16.0	---	---	---	21.5	20.5	21.0	19.0	16.5	17.5
12	20.0	15.5	17.0	---	---	---	21.5	20.5	21.0	19.5	16.0	17.0
13	18.5	16.0	16.5	---	---	---	23.0	21.0	22.0	19.5	16.0	17.0
14	18.0	16.0	17.0	---	---	---	21.5	20.5	21.0	18.5	16.0	17.0
15	20.0	17.5	18.5	---	---	---	22.0	20.5	21.0	18.0	15.5	16.5
16	20.5	19.5	20.0	---	---	---	22.5	20.0	21.0	17.5	15.5	16.5
17	21.0	20.0	20.5	---	---	---	22.0	19.5	20.5	17.0	15.5	16.0
18	20.5	19.5	20.0	---	---	---	22.0	19.0	20.5	16.5	15.5	16.0
19	21.0	20.0	20.5	---	---	---	22.5	19.0	20.5	17.0	15.0	15.5
20	21.0	19.5	20.0	---	---	---	22.5	19.0	20.5	16.0	14.5	15.0
21	20.5	19.0	19.5	---	---	---	22.5	18.5	20.0	15.5	13.5	15.0
22	19.5	18.5	19.0	---	---	---	21.0	19.0	20.0	16.5	12.0	14.0
23	20.0	18.0	19.0	22.5	21.5	22.0	22.5	19.0	20.0	16.5	11.5	13.5
24	---	---	---	22.0	21.0	21.5	22.5	19.0	20.0	16.0	13.5	14.0
25	---	---	---	22.5	20.5	21.5	20.5	18.5	19.5	14.5	13.5	14.0
26	---	---	---	22.0	20.5	21.5	20.0	19.0	19.5	15.0	13.5	14.0
27	---	---	---	23.0	20.0	21.5	20.0	19.0	19.5	13.5	12.0	12.5
28	---	---	---	22.5	20.5	21.0	21.5	19.0	20.0	15.0	11.0	12.5
29	---	---	---	22.5	20.0	20.5	20.5	20.0	20.0	13.5	11.5	12.5
30	---	---	---	21.5	19.5	20.5	21.0	20.0	20.0	12.0	11.0	11.5
31	---	---	---	23.0	20.0	21.0	21.0	19.5	20.0	---	---	---
MONTH							24.5	18.5	21.0	21.5	11.0	16.0

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI

LOCATION.--Lat 45°55'51", long 87°58'18", in SE¼ SE¼ sec.19, T.41 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on left bank 20 ft (6 m) upstream from culvert on County Road 866, 1.2 mi (1.9 km) downstream from Steel Creek, and 9.0 mi (14.5 km) northeast of Iron Mountain.

DRAINAGE AREA.--16.8 mi² (43.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water year 1971. October 1971 to September 1981 (discontinued).

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Sept. 7, 1979. Datum of gage is 1,034 ft (315.16 m) National Geodetic Vertical Datum of 1929, from topographic leveling (nearest 0.5 ft). Mar. 22 to Nov. 23, 1971, nonrecording gage 20 ft (6 m) downstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Flow for period Oct. 1 to Feb. 28 includes an average of 4.5 ft³/s (0.13 m³/s) diverted from West Branch Sturgeon River basin. Regulation and storage by reservoirs in the headwaters.

AVERAGE DISCHARGE.--5 years (water years 1972-76), 14.5 ft³/s (0.411 m³/s), 11.72 in/yr (298 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 272 ft³/s (7.70 m³/s) May 16, 1976, gage height, 6.42 ft (1.957 m); maximum gage height, 8.8 ft (2.68 m) Mar. 27, 1979, from floodmark in gage house, backwater from ice; minimum discharge, 0.70 ft³/s (0.020 m³/s) Aug. 11, 12, 1975; minimum gage height, 1.46 ft (0.445 m) Aug. 11, 12, 1975, and July 27, 28, Aug. 15, 1977, result of unusual regulation upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 102 ft³/s (2.89 m³/s) June 15, gage height, 5.06 ft (1.542 m); minimum daily, 4.4 ft³/s (0.12 m³/s) Sept. 24, 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	11	16	7.8	8.0	24	25	21	9.0	24	8.5	7.8
2	34	11	16	7.6	8.1	17	21	17	9.3	22	10	7.8
3	34	11	15	7.4	8.2	14	21	21	12	20	8.0	6.9
4	32	11	17	7.2	8.2	15	65	43	12	19	15	6.4
5	29	11	17	7.2	7.9	13	71	68	12	22	10	6.3
6	26	12	17	7.0	7.8	14	53	76	11	21	9.0	6.3
7	24	12	17	7.0	7.9	14	36	61	9.6	19	13	8.1
8	23	13	17	7.0	8.4	13	34	45	9.6	17	13	11
9	23	15	15	7.0	8.4	12	29	36	9.1	15	11	8.0
10	23	15	12	6.9	8.4	12	25	30	8.1	14	16	6.6
11	23	15	11	6.9	8.4	11	24	27	7.2	13	17	6.3
12	22	16	10	6.8	7.5	12	23	23	7.5	12	15	6.3
13	21	22	10	6.9	7.3	13	23	21	7.1	12	13	6.2
14	20	25	9.8	6.9	7.3	11	40	18	64	10	13	6.1
15	18	24	9.6	6.9	7.3	12	35	16	98	10	18	6.1
16	17	23	9.4	6.9	7.5	10	30	15	80	10	13	5.6
17	17	22	9.0	6.9	8.0	10	28	14	59	11	9.9	5.6
18	16	20	8.8	7.0	8.4	9.7	26	16	42	13	9.7	5.4
19	14	19	8.4	7.0	9.8	9.6	24	15	30	12	9.6	5.2
20	12	18	8.2	7.0	11	9.4	22	11	25	11	9.6	5.8
21	12	18	8.0	7.1	11	9.4	20	10	25	11	8.8	5.4
22	10	18	8.0	7.2	14	11	19	12	24	10	7.0	4.8
23	10	18	8.0	7.3	30	12	46	11	24	9.6	6.6	4.5
24	11	17	8.0	7.4	35	12	57	9.3	25	8.8	6.6	4.4
25	18	15	8.0	7.5	22	13	49	12	23	8.5	6.6	4.4
26	18	14	8.0	7.7	18	14	39	12	18	8.3	6.9	4.8
27	15	14	8.0	7.8	20	14	32	12	16	8.2	7.8	5.0
28	13	14	8.0	7.8	26	17	29	12	15	8.2	7.8	5.6
29	13	15	8.0	7.9	---	23	27	11	33	8.2	7.8	4.6
30	12	15	8.0	8.0	---	29	24	11	32	7.4	7.8	5.0
31	11	---	8.0	8.0	---	25	---	10	---	6.8	7.8	---
TOTAL	606	484	341.2	225.0	339.8	435.1	997	716.3	756.5	402.0	322.8	182.3
MEAN	19.5	16.1	11.0	7.26	12.1	14.0	33.2	23.1	25.2	13.0	10.4	6.08
MAX	35	25	17	8.0	35	29	71	76	98	24	18	11
MIN	10	11	8.0	6.8	7.3	9.4	19	9.3	7.1	6.8	6.6	4.4

CAL YR 1980 TOTAL 5931.7 MEAN 16.2 MAX 113 MIN 3.5
WTR YR 1981 TOTAL 5808.0 MEAN 15.9 MAX 98 MIN 4.4

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972 to September 1981 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1971 to September 1981.

INSTRUMENTATION.--Temperature recorder since Nov. 10, 1971.

REMARKS.--Temperature recorder clock stopped Oct. 17-28 (range in temperature 1.0 to 8.0°C), July 28-30 (range in temperature 16.0 to 19.0°C), Aug. 26 to Sept. 3 (range in temperature 12.0 to 15.5°C). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C July 7-10; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
OCT							
29...	1015	12	510	8.0	1.0	12.9	94
DEC							
03...	1345	15	670	8.0	.0	13.4	95
30...	1030	8.1	575	7.7	.0	12.8	91
FEB							
05...	1200	8.0	537	7.5	.0	11.6	82
26...	1115	18	322	7.2	.0	12.7	90
APR							
08...	0950	95	297	7.6	4.0	11.9	94
MAY							
01...	1045	23	374	7.7	7.0	--	--
28...	0910	12	425	7.8	11.5	9.5	90
JUL							
30...	1340	6.6	552	8.1	16.5	8.6	92
SEP							
03...	0915	7.1	512	8.1	12.5	9.2	88
30...	1000	5.0	611	7.9	8.5	9.3	81

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	11.5	2.0	2.0	.5	.5	.0	.0	.0	.0	.0	.0
2	12.0	10.5	2.0	2.0	.5	.0	.0	.0	.0	.0	.0	.0
3	10.5	9.5	3.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
4	9.5	9.5	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
5	9.5	8.5	3.0	2.0	1.0	.0	.0	.0	.0	.0	.0	.0
6	9.5	8.5	3.0	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
7	9.0	8.0	3.0	3.0	1.0	1.0	.0	.0	.0	.0	.0	.0
8	9.5	9.0	3.0	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
9	9.5	8.0	2.5	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
10	9.0	8.5	2.5	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
11	9.0	8.0	2.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
12	8.0	7.5	1.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
13	7.5	7.0	1.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
14	7.0	6.5	1.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
15	7.0	6.5	1.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
16	6.5	6.0	1.5	1.0	1.0	.5	.0	.0	.0	.0	.0	.0
17	---	---	1.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
18	---	---	1.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
19	---	---	1.0	.5	.5	.0	.0	.0	.0	.0	.5	.0
20	---	---	1.0	.5	.0	.0	.0	.0	.0	.0	.5	.5
21	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.5	.5
22	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.5	.5
23	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.5	.5
24	---	---	1.0	.5	.0	.0	.0	.0	.0	.0	1.0	.5
25	---	---	.5	.5	.0	.0	.0	.0	.0	.0	1.0	1.0
26	---	---	.5	.5	.0	.0	.0	.0	.0	.0	1.0	1.0
27	---	---	.5	.5	.0	.0	.0	.0	.0	.0	3.0	1.5
28	---	---	.5	.5	.0	.0	.0	.0	.0	.0	3.5	2.5
29	1.5	1.0	.5	.5	.0	.0	.0	.0	---	---	3.5	3.5
30	2.0	1.5	.5	.5	.0	.0	.0	.0	---	---	3.5	3.5
31	2.0	2.0	---	---	.0	.0	.0	.0	---	---	4.0	3.5
MONTH			3.0	.5	1.0	.0	.0	.0	.0	.0	4.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4.0	3.5	9.5	7.0	17.0	15.0	20.0	17.0	19.0	17.5	---	---
2	6.0	3.0	9.5	7.0	16.0	15.0	20.5	19.0	18.0	17.0	---	---
3	6.0	5.0	9.0	8.5	18.0	16.0	20.5	19.5	19.0	17.5	---	---
4	6.0	3.0	9.5	8.5	18.5	16.0	21.0	20.0	19.0	18.0	15.5	15.0
5	3.5	2.5	10.0	8.0	19.0	16.0	22.0	19.5	18.0	16.0	15.0	15.0
6	4.5	2.5	11.0	7.5	18.5	15.5	23.5	20.5	17.5	16.5	15.0	15.0
7	4.5	4.0	12.0	9.5	18.5	14.5	24.0	22.0	17.0	16.0	15.0	15.0
8	4.0	4.0	12.0	10.0	15.5	14.5	24.0	22.5	16.0	15.0	15.0	14.5
9	6.0	4.0	11.0	10.0	15.5	13.5	24.0	23.0	16.0	15.0	14.5	12.0
10	8.0	6.0	10.5	8.0	17.5	15.0	24.0	20.5	15.5	15.0	16.5	14.0
11	9.5	7.0	10.5	8.5	17.5	14.0	23.0	21.0	15.0	14.0	17.5	16.5
12	9.5	7.0	12.5	9.5	18.5	15.5	22.0	21.5	15.0	14.5	17.5	15.5
13	9.5	7.0	14.0	10.0	18.5	17.5	23.0	21.0	16.5	15.0	16.0	15.0
14	7.0	5.5	14.5	11.5	17.5	16.5	23.0	20.5	17.0	16.5	16.0	16.0
15	6.5	4.0	14.5	11.0	19.0	17.5	20.5	19.0	17.0	16.5	16.0	14.0
16	7.5	5.0	14.5	11.0	18.0	17.5	19.0	19.0	16.5	14.5	14.0	12.5
17	9.5	7.5	14.5	10.5	18.0	15.0	20.0	19.0	15.0	12.0	12.5	11.5
18	9.5	7.0	14.0	9.5	18.5	17.5	20.0	18.5	14.0	12.5	11.5	11.0
19	9.5	7.5	15.0	10.5	18.5	16.5	21.0	19.5	14.0	13.0	11.0	11.0
20	7.5	5.0	16.0	11.5	18.0	16.5	21.0	20.0	15.0	13.0	11.0	10.0
21	7.0	5.0	17.0	13.5	17.0	15.5	20.0	18.0	15.0	13.5	10.0	10.0
22	5.5	5.5	17.0	13.5	17.0	17.0	19.0	16.0	15.0	14.5	10.0	9.0
23	5.5	5.5	16.0	15.0	17.0	14.5	18.0	15.5	16.5	15.0	9.0	7.0
24	5.5	4.5	16.0	15.5	17.0	16.5	19.0	18.0	17.0	16.5	10.0	8.0
25	7.0	4.5	16.0	15.0	17.5	16.5	20.0	19.0	17.0	15.0	10.5	10.0
26	7.0	6.0	14.5	14.0	18.0	15.0	20.0	17.5	---	---	11.5	10.5
27	7.0	6.0	13.5	12.5	19.0	16.0	18.0	15.5	---	---	11.5	10.5
28	7.0	7.0	16.0	11.5	19.0	18.0	---	---	---	---	10.5	9.0
29	9.0	5.0	18.0	15.0	18.0	17.0	---	---	---	---	9.0	9.0
30	9.0	7.5	18.0	14.5	19.0	17.0	---	---	---	---	9.0	8.5
31	---	---	17.0	13.0	---	---	18.5	17.5	---	---	---	---
MONTH	9.5	2.5	18.0	7.0	19.0	13.5						

04066000 MENOMINEE RIVER NEAR PEMBINE, WI

LOCATION.--Lat 45°35'56", long 87°46'32", in SW 1/4, sec.16, T. 37 N., R.28 W., Michigan Meridian, Menominee County, MI, Hydrologic Unit 04030108, on left bank 0.6 mi (1.0 km) upstream from Pemene Creek, 4.0 mi (6.4 km) west of Nathan, MI, 10.9 mi (17.5 km) southeast of Pembine, and at mile 65.8 (105.9 km).

DRAINAGE AREA.--3,110 mi^2 (8,050 km^2).

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1277: 1952. WDR WI-80-1: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 770 ft (235 m), from river-profile map. Prior to Oct. 28, 1972, at site 0.5 mi (0.8 km) downstream at datum 15 ft (4.6 m) lower.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by powerplants and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm^3), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm^3), on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--32 years, 2,986 ft^3/s (84.57 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,900 ft^3/s (762 m^3/s) May 8, 1960, gage height, 13.90 ft (4.237 m); minimum, 694 ft^3/s (19.7 m^3/s) Sept. 3, 1969, gage height, 1.66 ft (0.506 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 18,500 ft^3/s (524 m^3/s) June 16, gage height, 15.84 ft (4.828 m); minimum daily, 1,200 ft^3/s (34.0 m^3/s) Sept. 27.

RATING TABLE (gage height, in feet, and discharge, in cubic feet per second).
(Stage-discharge relation affected by ice Dec. 11-13, Dec. 15 to Mar. 7.)

7.0	1,050	10.0	5,080
8.0	2,110	12.0	9,000
9.0	3,470	14.0	13,600
		16.0	19,000

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4590	3130	2380	2300	2300	3100	4040	5430	3060	6390	2310	2370
2	4350	2560	2670	2100	2300	3500	4350	4630	2930	5420	2320	2260
3	4510	2690	2390	2100	2400	3100	4780	4640	2910	4950	2480	1820
4	4530	2480	2120	2300	2400	3100	6550	6220	3830	4120	2690	2070
5	4440	2310	2150	2300	2400	3500	9580	8300	3850	3700	2840	2000
6	4110	2450	2130	2200	2400	3300	9710	10900	3770	3000	3110	1640
7	3200	2430	2320	2200	2400	2900	9050	12100	3180	3100	3060	1760
8	2580	2470	2600	2100	2400	2450	7110	12300	3410	3000	3720	2000
9	2520	2030	2400	2100	2500	2270	6620	10600	3320	2940	3440	2810
10	2470	2140	2410	2100	2400	2350	5000	8250	3220	2800	4650	2050
11	2620	2270	2300	2200	2400	2370	5650	5590	3010	2610	4140	1970
12	2680	2590	2400	2500	2300	2470	5340	4840	2950	2670	3700	1660
13	2470	3540	2400	2600	2300	2500	4960	4840	3040	2790	3630	1410
14	2710	3990	2390	2300	2300	2570	4800	4620	4740	2350	3570	1580
15	2460	3440	2000	2300	2400	2460	5130	4520	10500	2620	3300	1790
16	2790	3190	2100	2200	2500	2490	4740	4300	17600	2500	2900	1680
17	2670	3560	2300	2300	2600	2510	5020	3700	16700	2590	2600	1450
18	2760	3540	2400	2300	2500	2680	4930	2980	11700	2080	2800	1400
19	2580	3240	2400	2300	2900	2190	3890	2920	7720	2040	2600	1300
20	2760	2830	2200	2100	2700	2100	3850	2790	6850	2200	2500	1500
21	2390	2990	2000	2200	2600	1590	3810	2550	6020	3100	2300	1800
22	2430	2500	2000	2400	2400	1510	3960	2660	5770	3810	1800	1800
23	2810	1950	2100	2400	2900	1580	4540	2390	6470	3540	1700	1900
24	2330	2000	2400	2500	3600	2270	7260	2440	7290	3150	2100	1600
25	2480	2400	2200	2400	3100	1890	8630	2590	6800	3120	1900	1600
26	2980	2500	2200	2400	2500	1750	8300	2850	5900	2780	1950	1500
27	3370	2490	2000	2400	3200	1760	7760	2780	5570	2730	1840	1200
28	4170	2470	2100	2500	3100	1740	7500	3010	5080	2970	1940	1400
29	4060	2220	2100	2500	---	2010	6510	3020	5130	2960	2000	1600
30	4250	2090	2200	2400	---	3190	5660	3050	5560	2680	1970	1500
31	3750	---	2100	2300	---	3530	---	3140	---	2690	2210	---
TOTAL	98820	80490	69860	71300	72200	76730	179030	154950	177880	97400	84070	52420
MEAN	3188	2683	2254	2300	2579	2475	5968	4998	5929	3142	2712	1747
MAX	4590	3990	2670	2600	3600	3530	9710	12300	17600	6390	4650	2810
MIN	2330	1950	2000	2100	2300	1510	3810	2390	2910	2040	1700	1200

CAL YR 1980 TOTAL 1008800 MEAN 2756 MAX 9530 MIN 1050
WTR YR 1981 TOTAL 1215150 MEAN 3329 MAX 17600 MIN 1200

04067000 MENOMINEE RIVER BELOW KOSS, MI

LOCATION.--Lat 45°21'16", long 87°38'55", in sec.9, T.34 N., R.27 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank at powerplant of Wisconsin Public Service Corp., 0.5 mi (0.8 km) upstream from Little Cedar River, 3.6 mi (5.8 km) southeast of Koss, and at mile 24.7 (39.7 km).

DRAINAGE AREA.--3,730 mi² (9,660 km²).

PERIOD OF RECORD.--July 1907 to March 1909 (published as "at Koss"), July 1913 to September 1981 (discontinued).

REVISED RECORDS.--WDR WI-80-1: Drainage area.

GAGE.--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees. Prior to June 1913, chain gage on railroad bridge 4 mi (6.4 km) upstream.

REMARKS.--Daily discharges computed on basis of average daily load and load-discharge rating of combined hydroelectric units. Flow regulated by powerplants, and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³) on Michigamme River, and by many smaller reservoirs above station.

COOPERATION.--Records of daily discharge furnished by Wisconsin Public Service Corp. since 1913.

AVERAGE DISCHARGE.--69 years (water years 1908, 1914-81), 3,160 ft³/s (89.49 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 33,000 ft³/s (935 m³/s) May 10, 1960; minimum daily, 162 ft³/s (4.59 m³/s) Sept. 15, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 16,400 ft³/s (464 m³/s) June 18; minimum daily, 1,480 ft³/s (41.9 m³/s) Sept. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5400	3570	2270	2290	2400	3340	4940	6490	3100	6520	2540	2420
2	5160	2790	1780	2270	2370	4320	4870	5900	2990	6500	2350	2480
3	4550	2720	1720	2140	2350	4870	5340	4710	3030	5900	2670	2210
4	4640	2770	2080	2270	2370	4960	6160	5470	3620	5270	2670	2040
5	5090	2480	2270	2100	2350	4080	8240	7320	4000	4050	2520	2040
6	5030	2310	2610	2310	2420	3840	10600	9150	4080	3250	3070	1990
7	3870	2500	3030	2180	2290	4160	11100	10700	4090	3160	3200	1990
8	3040	2650	2930	2080	2400	3500	10200	11800	3320	3140	3240	2350
9	2650	2840	1970	2230	2370	3220	7960	12000	3350	2840	3810	2440
10	2610	1930	1820	2060	2370	2820	7240	11100	3380	2820	3880	2860
11	2340	2310	2010	2200	2330	2880	6100	8450	3140	2590	5020	2060
12	2500	2460	2440	2330	2330	3050	6400	5560	3050	2990	4560	1970
13	2670	3200	2630	2500	2350	2900	5910	5570	2860	2760	3420	1630
14	2610	3900	2120	2460	2270	3620	6170	6130	3630	2880	3390	1630
15	2520	4780	3600	2350	2370	2610	4850	5800	6800	2440	3600	1870
16	2500	3450	2250	2140	2460	3890	5920	5680	11000	2760	3010	1930
17	2840	3270	2610	2260	2440	3160	5790	5000	16000	2630	2690	1910
18	2900	3970	2270	2420	2460	2250	5280	3780	16400	2760	2740	1630
19	2800	3650	2230	2270	2650	3280	5630	3390	13000	2180	2690	1530
20	2370	2990	2250	2400	2620	2710	4010	2750	9000	2290	2610	1530
21	2760	2860	2010	2310	2820	2350	3580	2780	7240	2630	2520	[illegible]
22	2500	2820	1970	2370	2900	1680	3720	2540	6520	3650	2160	[illegible]
23	2440	2440	1780	2540	3260	2010	4270	2710	6860	4380	1720	1930
24	3120	2200	2310	2330	3360	2200	6070	2630	6890	4050	2140	1820
25	2140	2230	2290	2480	4350	2480	8340	2710	7420	3320	1950	1800
26	3050	2710	2180	2420	4260	2100	8740	3030	7030	3030	1990	1680
27	3100	2460	1990	2420	4320	2230	8970	3120	6080	2740	2250	1510
28	4190	2520	1930	2500	4300	2160	8990	2860	6130	2740	1600	1480
29	4690	2540	2200	2460	---	2330	8180	3200	6210	3050	2200	1530
30	4540	2350	2120	2590	---	3260	6850	3380	6190	2900	2010	1590
31	4500	---	2040	2370	---	4200	---	3250	---	2560	2590	---
TOTAL	105120	85670	69710	72050	77540	94460	200420	168960	186410	104780	[illegible]	[illegible]
MEAN	3391	2856	2249	2324	2769	3047	6681	5450	6214	3380	2801	1912
MAX	5400	4780	3600	2590	4350	4870	11100	12000	16400	6520	5020	2860
MIN	2140	1930	1720	2060	2270	1680	3580	2540	2860	2180	1720	1480

CAL YR 1980 TOTAL 1116330 MEAN 3050 MAX 10700 MIN 1020
WTR YR 1981 TOTAL 1309500 MEAN 3588 MAX 16400 MIN 1480

04067500 MENOMINEE RIVER NEAR MC ALLISTER, WI
(NATIONAL STREAM-QUALITY ACCOUNTING NETWORK STATION)

LOCATION.--Lat 45°19'33", long 87°39'48", in SW 1/4 SE 1/4 sec.17, T.33 N., R.23 E., Marinette County, Hydrologic Unit 04030108, on right bank 85 ft (26 m) downstream from bridge on County Highway JJ, 2.9 mi (4.7 km) downstream from Grand Rapids Dam, 2.6 mi (4.2 km) east of McAllister, 1.9 mi (3.1 km) downstream from Little Cedar River, and at mile 22.6 (36.4 km).

DRAINAGE AREA.--3,930 mi^2 (10,200 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1945 to September 1961; October 1961 to September 1979, miscellaneous measurements and peaks only; October 1979 to current year.

REVISED RECORDS.--WDR WI-80-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 622.20 ft (189.647 m) National Geodetic Vertical Datum of 1929 (Michigan Department of Transportation reference mark). Prior to May 15, 1945, nonrecording gage 1,400 ft (427 m) downstream at same datum; May 16, 1945, to September 1961, water-stage recorder 1,000 ft (305 m) downstream at same datum; October 1961 to September 1979, crest-stage gage 1,100 ft (335 m) downstream at same datum.

REMARKS.--Records good except those for winter period and period of no gage-height record, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm^3), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm^3) on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--18 years (water years 1946-61, 1980-81), 3,431 ft^3/s (97.17 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 32,500 ft^3/s (920 m^3/s) May 9, 1960, gage height, 20.0 ft (6.096 m), from graph based on gage readings, minimum observed, 538 ft^3/s (15.2 m^3/s) Oct. 6, 1946, gage height, 7.29 ft 2.222 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 19,800 ft^3/s (561 m^3/s) June 18, gage height, 17.23 ft (5.252 m); minimum daily 1,420 ft^3/s (40.2 m^3/s) Sept. 28.

RATING TABLE (gage height, in feet, and discharge, in cubic feet per second).
(Stage-discharge relation affected by ice Dec. 2-4, 9-14, and Dec. 16 to Mar. 7.)

8.6	1,290	11.0	4,700
9.0	1,770	12.0	6,400
9.5	2,430	14.0	10,500
10.0	3,150	16.0	15,900
		18.0	22,500

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6000	3980	2560	2700	2800	3700	4500	6800	3460	6210	2910	2800
2	5650	3650	2200	2700	2800	3700	5400	6200	3330	6850	2750	2660
3	4900	2850	2200	2600	2800	5000	5400	5400	3360	5990	2680	2710
4	4970	3120	2400	2600	2800	5400	6620	5800	3680	5300	2910	2190
5	5360	2900	2500	2500	2700	3900	9520	7600	4010	4570	2800	2300
6	5170	2710	2770	2700	2800	4800	12000	9800	4110	4060	3220	2190
7	4320	2800	3330	2600	2700	4500	12200	11000	4000	3540	3550	2010
8	3660	3030	3560	2500	2800	4650	11200	13000	3700	3670	3560	2400
9	3140	3270	2800	2600	2800	4620	8860	13000	3450	3270	4100	2640
10	3170	2500	2200	2500	2800	3930	8140	12000	3540	3160	4170	3080
11	2940	2630	2400	2600	2700	3800	6650	9000	3380	3070	5090	2610
12	3050	2690	2900	2700	2700	3500	6400	6000	3330	2990	4760	2060
13	3010	3210	3000	2900	2700	3500	6600	5600	3180	3130	3940	2030
14	3000	4150	2900	2900	2700	3500	6200	5400	3600	3160	3730	1440
15	3090	4740	4020	2800	2800	3800	5400	5200	6810	2760	3900	1970
16	2870	4040	2600	2500	2900	3400	5200	5000	12300	2850	3450	2020
17	3480	3440	3000	2600	2900	4000	6200	4800	18300	2880	3140	2040
18	3270	4170	2700	2800	2900	3600	6000	4100	19400	3160	2910	1880
19	3210	3950	2600	2700	3100	3100	5600	3300	15000	2650	3120	1590
20	2860	3640	2600	2800	3100	3400	5800	3200	10000	2280	2870	1540
21	2900	3110	2400	2700	3300	3200	4300	3100	8040	2680	2810	1570
22	2700	3430	2300	2700	3400	2800	3900	2900	6910	3760	2540	1880
23	2700	2900	2200	2900	3800	2200	4000	2900	6950	4460	2000	2000
24	3200	2740	2700	2800	3900	2400	4500	2700	7250	4220	1930	2040
25	2500	2410	2600	2900	5000	2600	6200	2700	7920	3710	2200	1760
26	3200	2860	2600	2800	5000	2700	8600	2900	7460	3510	2200	1970
27	3300	2850	2400	2800	5000	2600	9400	3200	6140	2950	2130	1740
28	4160	2920	2300	2900	5000	2600	9400	3140	5780	2940	2380	1420
29	4920	2890	2500	2900	---	2500	8600	3570	5740	3410	1960	1550
30	4830	2690	2500	3000	---	2600	7200	3620	5880	3230	2370	1640
31	4540	---	2400	2800	---	3500	---	3560	---	2910	2540	---
TOTAL	116070	96270	82140	84500	90700	109500	209990	176490	200010	113330	94620	61730
MEAN	3744	3209	2650	2726	3239	3532	7000	5693	6667	3656	3052	2058
MAX	6000	4740	4020	3000	5000	5400	12200	13000	19400	6850	5090	3080
MIN	2500	2410	2200	2500	2700	2200	3900	2700	3180	2280	1930	1420

CAL YR 1980 TOTAL 1259180 MEAN 3440 MAX 12300 MIN 1350
WTR YR 1981 TOTAL 1435350 MEAN 3932 MAX 19400 MIN 1420

NOTE.--No gage-height record Oct. 21-27, Mar. 12 to Apr. 3, Apr. 12 to May 27.

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--December 1977 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
NOV 19...	1345	4060	200	8.1	2.0	12.4	93	K14	K9	95	17
JAN 07...	1200	6040	230	8.1	.0	10.2	72	30	K4	100	1
APR 08...	1330	11600	140	7.3	5.0	12.4	101	46	K17	75	--
MAY 12...	1415	5980	130	7.7	12.0	11.2	108	K7	54	70	--
JUL 16...	1330	3120	175	8.1	22.0	7.0	83	K11	130	92	--
SEP 16...	1415	1690	220	8.2	17.5	--	--	K14	120	110	--

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
NOV 19...	22	9.7	2.3	5	.1	1.1	--	12	2.8	.1
JAN 07...	24	10	1.7	4	.1	.9	--	12	3.1	.1
APR 08...	17	8.0	1.6	4	.1	1.1	.80	8.9	2.2	<.1
MAY 12...	16	7.3	1.6	5	.1	.8	.60	7.3	2.1	<.1
JUL 16...	21	9.6	2.1	5	.1	.9	.70	11	2.3	<.1
SEP 16...	26	12	2.6	5	.1	1.2	--	12	3.9	<.1

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC TOTAL (MG/L AS N)
NOV 19...	8.3	125	106	1370	.16	.15	.030	.040	.05	.23
JAN 07...	10	134	123	2190	.23	.22	.070	.040	.05	.15
APR 08...	7.5	111	85	3470	.18	.18	.060	.060	.08	.49
MAY 12...	5.9	107	77	1730	.08	.09	.050	.070	.09	.62
JUL 16...	7.8	128	104	1080	.14	.13	.030	.020	.03	.53
SEP 16...	6.7	133	125	607	<.01	<.01	.020	.030	.04	.46

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 19...	.26	.42	1.9	.020	.06	.010	--	2	22	50
JAN 07...	.22	.45	2.0	.030	.09	.020	6.8	3	49	73
APR 08...	.55	.73	3.2	.030	.09	.010	10	16	499	32
MAY 12...	.67	.75	3.3	.020	.06	.020	9.6	4	65	79
JUL 16...	.56	.70	3.1	.030	.09	<.010	--	4	34	80
SEP 16...	.48	1.3	5.9	.010	.03	.020	--	1	4.6	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)
NOV 19...	1345	1	1	100	10	2	1	0	<10	0	2
JUL 16...	1330	2	1	100	10	1	1	20	<10	5	1
SEP 16...	1415	2	2	100	100	<1	2	10	10	1	<1

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)
NOV 19...	5	2	370	170	4	0	20	10	.1	.2
JUL 16...	5	3	350	110	4	2	90	10	.2	<.1
SEP 16...	6	4	230	50	1	<1	40	20	.2	<.1

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
NOV 19...	5	11	0	0	0	0	30	10	8.3	.5
JUL 16...	8	9	0	0	0	0	50	20	10	--
SEP 16...	1	1	<1	<1	<1	<1	70	20	9.2	.3

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 19,80	MAY 12,81	JUL 16,81	SEP 16,81
TIME	1345	1415	1330	1415
TOTAL CELLS/ML	950	170	700	830
DIVERSITY: DIVISION	0.5	1.0	1.6	1.1
.CLASS	0.5	1.0	1.6	1.3
..ORDER	0.7	1.0	2.4	2.1
...FAMILY	0.8	1.5	3.0	3.0
....GENUS	0.8	2.2	3.1	3.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	13	2	--	-
....OOCYSTIS	--	-	--	-	--	-	57	7
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	52#	31	--	-	--	-
....SCENEDESMUS	--	-	52#	31	26	4	110	14
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	26	4	160#	19
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	52	5	--	-	120#	17	43	5
....MELOSIRA	--	-	--	-	--	-	57	7
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	13	2	43	5
....COCCONEIS	--	-	--	-	26	4	140#	17
...FRAGILARIACEAE								
....FRAGILARIA	26	3	--	-	64	9	--	-
....SYNEDRA	--	-	26#	15	13	2	14	2
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	29	3
...NAVICULACEAE								
....NAVICULA	13	1	13	8	64	9	110	14
...NITZSCHIACEAE								
....NITZSCHIA	26	3	26#	15	13	2	14	2
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...DINOBRYACEAE								
....DINOBRYON	--	-	--	-	--	-	29	3
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	13	2	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	64	9	--	-
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	230#	33	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	840#	88	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	14	2
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	13	2	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW¼ SW¼ sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) upstream from bridge on 13 Mile Rd., 2.0 mi (3.2 km) east of Burlington, 4.0 mi (6.4 km) downstream from Tekonsha Creek, and at mile 164 (264 km).

DRAINAGE AREA.--201 mi² (521 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 167 ft³/s (4.729 m³/s), 11.28 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,030 ft³/s (29.2 m³/s), Mar. 6, 1976, gage height, 5.31 ft (1.618 m); maximum gage height, 5.51 ft (1.679 m) Feb. 5, 1968; minimum discharge, 8.0 ft³/s (0.23 m³/s) Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 710 ft³/s (20.1 m³/s) Feb. 24, gage height, 4.62 ft (1.408 m); maximum gage height, 4.65 ft (1.417 m) June 15; minimum discharge, 94 ft³/s (2.66 m³/s) Nov. 26, 27; minimum gage height, 2.14 ft (0.652 m) July 18, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	142	152	108	130	132	570	189	440	427	299	488	260
2	139	148	140	135	139	528	187	415	379	278	505	263
3	149	143	161	140	135	479	180	393	354	258	512	265
4	155	141	156	140	130	436	186	382	328	244	501	282
5	152	137	165	135	120	400	196	375	356	228	465	272
6	146	133	169	130	120	362	198	356	558	215	426	262
7	141	140	177	130	120	329	188	329	535	202	387	258
8	137	137	214	130	120	302	177	300	436	187	351	256
9	133	134	265	135	120	286	183	277	407	173	318	250
10	129	130	269	140	120	275	180	296	370	159	288	239
11	127	123	265	135	120	263	186	358	325	148	274	221
12	126	116	263	130	120	253	196	349	294	139	261	204
13	125	112	265	130	125	244	204	329	353	138	247	187
14	123	114	258	130	130	236	244	333	569	135	231	194
15	125	114	242	130	135	229	266	382	658	125	222	185
16	127	111	244	130	140	219	266	375	584	114	209	194
17	140	108	209	130	201	213	269	358	526	106	196	216
18	160	105	184	140	334	208	266	354	508	101	184	231
19	160	103	187	130	529	204	263	348	517	98	174	232
20	155	100	162	125	646	199	261	336	533	118	164	227
21	146	99	140	125	640	194	248	315	535	172	153	220
22	139	97	140	125	622	191	237	288	542	212	145	260
23	133	96	140	125	649	186	318	264	512	226	139	259
24	133	97	140	125	690	182	340	257	458	224	134	243
25	150	97	140	125	705	178	318	274	423	213	127	229
26	158	94	150	129	685	184	302	254	384	217	122	217
27	160	97	150	136	643	192	289	252	364	210	156	231
28	162	104	140	139	607	190	298	238	349	378	181	225
29	161	107	140	148	---	188	464	226	335	491	261	211
30	158	105	135	140	---	189	480	409	319	454	289	309
31	157	---	135	133	---	189	---	505	---	457	271	---
TOTAL	4448	3494	5653	4105	8977	8298	7579	10367	13238	6719	8381	7102
MEAN	143	116	182	132	321	268	253	334	441	217	270	237
MAX	162	152	269	148	705	570	480	505	658	491	512	309
MIN	123	94	108	125	120	178	177	226	294	98	122	185
CFSM	.71	.58	.91	.66	1.60	1.33	1.26	1.66	2.19	1.08	1.34	1.18
IN.	.82	.65	1.05	.76	1.66	1.54	1.40	1.92	2.45	1.24	1.55	1.31

CAL YR 1980 TOTAL 83069 MEAN 227 MAX 718 MIN 90 CFSM 1.13 IN 15.37
WTR YR 1981 TOTAL 88361 MEAN 242 MAX 705 MIN 94 CFSM 1.20 IN 16.35

04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE¼ SE¼ sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft (4 m) downstream from bridge on U.S. Highway 12, 1.0 mi (1.6 km) downstream from Little Hog Creek, and 3.1 mi (5.0 km) west of Allen.

DRAINAGE AREA.--48.7 mi^2 (126.1 km^2).

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft (308 m) from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 41.8 ft^3/s (1.184 m^3/s), 11.66 in/yr (296 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 426 ft^3/s (12.1 m^3/s) June 28, 1978, gage height 5.78 ft (1.762 m); minimum, 1.2 ft^3/s (0.034 m^3/s) Aug. 20, 21, 1971; minimum gage height, 1.33 ft (0.405 m) Sept. 30, Oct. 1, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 306 ft^3/s (8.67 m^3/s) June 15, gage height, 5.11 ft (1.558 m); minimum, 14 ft^3/s (0.396 m^3/s) Nov. 26, 27; minimum gage height, 1.92 ft (0.585 m) July 18, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	27	24	27	22	119	44	112	102	63	170	82
2	21	25	39	27	22	110	40	118	89	56	137	78
3	22	24	50	27	22	101	36	112	78	52	125	73
4	23	24	51	27	22	93	51	101	83	52	126	85
5	21	23	40	27	22	87	68	90	92	48	118	97
6	20	22	40	27	22	81	55	81	91	43	103	96
7	19	22	48	26	23	75	43	71	82	39	90	89
8	19	22	69	26	23	68	38	62	71	35	80	82
9	18	21	90	26	23	63	41	55	77	31	80	75
10	17	21	98	25	24	60	42	61	86	28	79	67
11	17	19	96	25	24	58	40	82	85	25	74	58
12	19	18	87	24	24	53	45	84	76	24	67	49
13	19	18	80	23	25	51	51	77	88	23	62	43
14	19	20	72	23	25	47	79	74	192	22	57	50
15	19	20	64	23	25	45	101	93	288	20	53	65
16	19	18	56	22	30	44	98	107	299	19	51	67
17	22	17	47	22	60	42	91	104	261	19	45	64
18	27	17	40	22	100	39	86	94	215	18	39	60
19	28	17	37	21	212	36	80	82	178	19	35	54
20	25	16	35	21	247	36	74	71	151	39	30	47
21	24	16	33	21	226	35	66	62	132	66	27	41
22	23	15	31	21	202	34	60	54	130	62	24	44
23	22	15	30	21	186	34	79	47	145	47	22	48
24	22	17	30	21	178	32	93	45	147	35	21	45
25	28	16	29	21	166	32	90	52	149	29	19	42
26	32	15	28	21	151	32	80	50	140	56	19	39
27	30	15	28	21	137	38	70	46	121	101	52	40
28	29	20	28	21	126	36	67	48	101	155	67	40
29	30	22	28	22	---	34	93	44	86	245	68	36
30	30	22	27	22	---	39	108	75	73	254	81	52
31	28	---	27	22	---	47	---	103	---	210	84	---
TOTAL	713	584	1482	725	2369	1701	2009	2357	3908	1935	2105	1808
MEAN	23.0	19.5	47.8	23.4	84.6	54.9	67.0	76.0	130	62.4	67.9	60.3
MAX	32	27	98	27	247	119	108	118	299	254	170	97
MIN	17	15	24	21	22	32	36	44	71	18	19	36
CFSM	.47	.40	.98	.48	1.74	1.13	1.38	1.56	2.67	1.28	1.39	1.24
IN.	.54	.45	1.13	.55	1.81	1.30	1.53	1.80	2.99	1.48	1.61	1.38

CAL YR 1980 TOTAL 17308 MEAN 47.3 MAX 200 MIN 11 CFSM .97 IN 13.22
WTR YR 1981 TOTAL 21696 MEAN 59.4 MAX 299 MIN 15 CFSM 1.22 IN 16.57

04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW¼ NE¼ sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Rd., 2.5 mi (4.0 km) northwest of Hodunk, and 3.5 mi (5.6 km) upstream from mouth.

DRAINAGE AREA.--293 mi² (759 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 26, 1963, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 242 ft³/s (6.853 m³/s), 11.22 in/yr (285 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,930 ft³/s (54.7 m³/s) June 28, 1978, gage height, 7.77 ft (2.368 m); minimum, 6.2 ft³/s (0.18 m³/s) Sept. 26, 1964; minimum gage height, 2.28 ft (0.695 m) Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,740 ft³/s (49.3 m³/s) July 30, gage height, 7.38 ft (2.249 m); minimum, 120 ft³/s (3.40 m³/s) Feb. 3, gage height, 3.10 ft (0.945 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	214	198	168	206	180	814	226	798	830	317	1310	517
2	208	196	188	204	178	747	222	771	703	310	1140	478
3	212	194	206	198	164	682	216	740	607	305	1010	444
4	210	190	204	196	170	631	222	682	478	300	926	478
5	204	186	202	190	170	588	241	623	365	296	867	554
6	198	184	204	190	174	554	249	490	363	285	783	554
7	194	182	214	192	170	517	243	370	365	273	711	520
8	190	180	296	180	166	487	228	363	355	256	650	496
9	184	180	464	180	160	461	226	353	360	243	599	469
10	182	176	493	180	166	441	226	383	378	230	541	441
11	180	176	464	186	172	421	228	458	381	222	402	407
12	178	174	427	184	178	404	237	490	376	186	378	373
13	178	174	394	180	180	391	251	469	444	145	368	343
14	176	176	365	174	186	378	317	469	744	141	360	376
15	174	176	340	170	186	365	461	526	1060	135	358	458
16	176	174	317	170	198	350	484	623	1100	135	348	458
17	184	170	278	168	256	340	461	646	1130	143	335	429
18	196	166	278	180	432	328	438	588	1110	139	317	418
19	194	166	273	170	763	314	418	538	1070	141	303	394
20	192	164	262	166	1040	305	407	487	1020	317	287	363
21	192	160	247	166	1080	300	389	446	913	631	247	338
22	190	160	237	166	1060	294	373	410	863	579	145	340
23	188	158	228	166	1010	262	441	370	818	435	145	345
24	188	158	222	164	969	180	499	360	771	278	148	326
25	194	156	210	164	917	186	493	389	728	166	148	307
26	198	154	200	168	867	192	472	378	744	186	146	298
27	198	156	200	174	838	204	449	355	695	258	276	314
28	202	160	202	178	888	212	484	343	638	740	370	317
29	202	164	208	174	---	216	783	333	517	1450	415	305
30	204	166	206	170	---	220	830	582	338	1710	511	321
31	202	---	206	178	---	228	---	863	---	1520	566	---
TOTAL	5982	5174	8403	5532	12918	12012	11214	15696	20264	12472	15110	12241
MEAN	193	172	271	178	461	387	374	506	675	402	487	408
MAX	214	198	493	206	1080	814	830	863	1130	1710	1310	554
MIN	174	154	168	164	160	180	216	333	338	135	145	298
CFSM	.66	.59	.93	.61	1.57	1.32	1.28	1.73	2.30	1.37	1.66	1.39
IN.	.76	.66	1.07	.70	1.64	1.53	1.42	1.99	2.57	1.58	1.92	1.55

CAL YR 1980 TOTAL 125743 MEAN 344 MAX 1520 MIN 99 CFSM 1.17 IN 15.96
WTR YR 1981 TOTAL 137018 MEAN 375 MAX 1710 MIN 135 CFSM 1.28 IN 17.40

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW¼ sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi (6.8 km) southwest of Athens, and 5.0 mi (8.0 km) downstream from Pine Creek.

DRAINAGE AREA.--162 mi^2 (420 km^2).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 143 ft^3/s (4.050 m^3/s), 11.99 in/yr (305 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft^3/s (31.7 m^3/s) June 29, 1978, gage height, 6.47 ft (1.972 m); minimum, 21 ft^3/s (0.59 m^3/s) July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft (0.113 m) Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 557 ft^3/s (15.8 m^3/s) Feb. 21, gage height, 4.12 ft (1.256 m); minimum daily discharge, 69 ft^3/s (1.95 m^3/s) Aug. 25, Sept. 16, 21; minimum gage height, 1.22 ft (0.372 m) Sept. 21.

DISCHARGE, IN CURIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	129	128	90	90	333	166	344	370	144	288	177
2	101	123	168	90	90	301	156	319	341	136	247	158
3	103	118	201	90	90	269	147	288	305	129	207	140
4	103	119	199	90	90	247	144	254	266	123	171	132
5	101	114	190	90	90	230	137	229	230	121	142	127
6	99	110	192	90	90	215	127	205	215	117	123	120
7	99	110	215	90	90	197	122	182	218	115	117	112
8	99	107	258	90	90	186	117	168	198	110	116	107
9	98	105	308	90	90	176	126	157	197	104	114	99
10	97	103	329	90	90	172	133	181	200	100	112	94
11	97	99	319	90	90	169	139	235	191	94	112	88
12	97	98	296	90	90	165	171	256	178	90	117	83
13	93	97	268	90	100	162	185	253	197	91	110	77
14	92	102	234	90	110	156	222	256	281	92	104	84
15	94	102	205	90	120	150	259	269	367	89	104	73
16	98	101	183	90	130	140	255	265	390	86	100	69
17	113	101	150	90	150	137	237	238	373	85	95	70
18	131	101	110	90	276	134	215	209	342	82	89	72
19	140	100	90	90	413	130	200	184	309	83	84	72
20	140	98	90	90	516	126	190	165	275	92	79	70
21	139	99	90	90	555	124	181	150	249	93	76	69
22	135	98	90	90	552	122	172	137	240	89	73	87
23	127	99	90	90	535	121	221	125	235	82	72	113
24	124	101	90	90	515	121	308	131	226	76	70	112
25	135	100	90	90	486	120	331	180	218	73	69	109
26	141	99	90	95	449	125	322	201	204	84	70	108
27	141	104	90	95	406	145	296	189	189	86	96	111
28	141	109	90	95	366	152	280	188	175	174	109	104
29	140	115	90	95	---	154	327	182	163	276	125	97
30	138	119	90	92	---	159	355	248	155	319	145	156
31	134	---	90	90	---	167	---	351	---	315	181	---
TOTAL	3596	3180	5123	2812	6759	5305	6241	6739	7497	3750	3717	3090
MEAN	116	106	165	90.7	241	171	208	217	250	121	120	103
MAX	141	129	329	95	555	333	355	351	390	319	288	177
MIN	92	97	90	90	90	120	117	125	155	73	69	69
CFSM	.72	.65	1.02	.56	1.49	1.06	1.28	1.34	1.54	.75	.74	.64
IN.	.83	.73	1.18	.65	1.55	1.22	1.43	1.55	1.72	.86	.85	.71

CAL YR 1980 TOTAL 57899 MEAN 158 MAX 438 MIN 69 CFSM .98 IN 13.30
WTR YR 1981 TOTAL 57809 MEAN 158 MAX 555 MIN 69 CFSM .98 IN 13.27

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°38'00", in SW¼ SE¼ sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft (76 m) downstream from Rocky River, and at mile 112 (180 km).

DRAINAGE AREA.--1,350 mi² (3,496 km²).

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft (238.152 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Flow regulated by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 1,123 ft³/s (31.80 m³/s), 11.30 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,810 ft³/s (165 m³/s) Mar. 7, 1976, gage height, 9.08 ft (2.768 m); minimum daily, 78 ft³/s (2.21 m³/s) Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s (234 m³/s) Apr. 27, 1950, gage height, 10.6 ft (3.23 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,190 ft³/s (119 m³/s) Feb. 24, gage height, 7.45 ft (2.271 m); minimum, 374 ft³/s (10.6 m³/s) July 20, gage height, 2.56 ft (0.780 m); minimum daily, 564 ft³/s (16.0 m³/s) July 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1080	1120	936	1070	993	3040	1240	2960	2700	1760	3370	1910
2	1060	1110	1030	1110	972	2960	1240	3010	2850	1450	3180	1980
3	1100	1030	1130	1050	910	2850	1280	2800	2640	1320	3000	1910
4	1070	904	1150	995	893	2700	1200	2660	2450	1270	2860	1820
5	1080	953	1290	975	916	2570	1270	2490	2130	1520	2540	1700
6	1060	1040	1250	904	841	2420	1210	2330	1900	1280	2490	1640
7	971	981	1210	838	947	2330	1110	2050	1830	1000	2350	1650
8	945	1080	1360	947	1030	2180	1190	1810	1690	1010	2230	1690
9	962	1020	1440	1180	933	2110	1240	1540	1780	1090	2130	1650
10	1010	924	1670	1230	745	2020	1270	1860	1870	1090	1980	1520
11	1010	850	1810	1080	990	1850	1160	2010	1780	940	1820	1460
12	1030	817	1860	902	984	1760	1470	2170	1640	937	1680	1370
13	937	956	1840	821	1060	1790	1530	2310	2040	935	1380	1340
14	914	975	1780	823	908	1810	1560	2350	2420	812	1360	1440
15	922	876	1660	673	994	1700	1740	2290	2590	727	1370	1470
16	946	820	1550	795	1080	1610	1820	2310	3340	763	1290	1240
17	1080	898	1460	870	1100	1640	1840	2290	3260	758	1290	1160
18	1080	845	1370	965	1590	1610	1940	2230	3250	689	1280	1180
19	1100	703	1340	891	2250	1560	1840	2180	3080	590	1200	1350
20	1080	908	1230	885	3370	1480	1670	2110	2830	564	1080	1360
21	960	934	1160	906	3580	1460	1650	1960	2770	848	1040	1190
22	981	838	1050	1020	3820	1440	1700	1830	2720	1020	974	1330
23	1110	769	962	1050	3890	1430	1670	1700	2420	1290	884	1320
24	1090	839	986	902	4000	1410	1810	1670	2500	1380	847	1190
25	1010	994	1070	888	3750	1270	2050	1650	2600	1230	747	1380
26	1040	921	1100	870	3650	1380	2080	1780	2340	1300	722	1350
27	1050	912	995	936	3560	1340	2040	1770	2130	1210	801	1470
28	1050	883	982	984	3310	1230	2220	1650	1980	1540	865	1420
29	992	880	1020	968	---	1280	2490	1590	1850	2080	1020	1420
30	1010	884	1010	915	---	1420	2610	1960	1770	2780	1310	1750
31	1040	---	1050	876	---	1420	---	2160	---	3110	1730	---
TOTAL	31770	27664	39751	29319	53066	57070	49140	65480	71150	38293	50820	44660
MEAN	1025	922	1282	946	1895	1841	1638	2112	2372	1235	1639	1489
MAX	1110	1120	1860	1230	4000	3040	2610	3010	3340	3110	3370	1980
MIN	914	703	936	673	745	1230	1110	1540	1640	564	722	1160
CFSM	.76	.68	.95	.70	1.40	1.36	1.21	1.56	1.76	.92	1.21	1.10
IN.	.88	.76	1.10	.81	1.46	1.57	1.35	1.80	1.96	1.06	1.40	1.23

CAL YR 1980 TOTAL 555986 MEAN 1519 MAX 4740 MIN 687 CFSM 1.13 IN 15.32
WTR YR 1981 TOTAL 558183 MEAN 1529 MAX 4000 MIN 564 CFSM 1.13 IN 15.38

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW¼ SW¼ sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft (3 m) upstream from bridge on State Highway 66, 3.0 mi (4.8 km) upstream from unnamed tributary, and 3.0 mi (4.8 km) southeast of Nottawa.

DRAINAGE AREA.--106 mi^2 (275 km^2).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 90.2 ft^3/s (2.554 m^3/s), 11.56 in/yr (294 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 523 ft^3/s (14.8 m^3/s), Mar. 6, 1976, gage height, 5.66 ft (1.725 m); maximum gage height, 5.86 ft (1.786 m) June 9, 1980, caused by bridge construction; minimum discharge, 11 ft^3/s (0.31 m^3/s), Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft (0.539 m) Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 474 ft^3/s (13.4 m^3/s) July 31, gage height, 5.55 ft (1.692 m); minimum, 51 ft ^{3}/s July 18, 19; minimum gage height, 2.69 ft (0.820 m) July 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	79	82	76	64	60	199	96	184	160	131	464	130
2	79	80	84	63	60	186	94	184	169	124	403	144
3	80	78	88	62	60	175	91	177	173	120	331	146
4	79	76	91	61	60	166	91	164	156	114	266	143
5	77	74	90	60	58	159	91	153	143	111	216	139
6	76	72	90	60	56	152	94	141	138	107	192	142
7	73	71	91	59	56	145	95	132	132	99	176	144
8	71	70	102	59	56	138	93	124	129	94	161	143
9	70	70	117	59	56	133	95	118	144	88	150	134
10	68	68	128	58	56	129	95	129	150	82	140	124
11	68	67	135	58	56	126	97	147	157	75	133	114
12	69	67	134	58	56	123	101	153	167	71	126	106
13	69	66	130	58	58	120	111	155	216	67	121	106
14	68	67	124	58	60	117	141	158	279	64	115	109
15	68	67	117	58	65	114	159	163	318	61	114	114
16	69	67	112	58	80	111	171	164	374	58	113	118
17	75	65	106	58	100	108	186	174	428	55	109	118
18	83	65	102	58	137	106	189	182	442	53	105	115
19	87	65	98	58	186	103	178	172	404	53	100	110
20	87	65	92	58	239	102	164	158	344	66	95	108
21	86	66	86	58	278	100	152	143	297	76	88	106
22	85	65	84	58	297	98	143	130	274	83	81	100
23	83	66	82	58	298	97	152	122	245	82	76	95
24	81	67	80	58	291	95	154	121	226	76	73	93
25	83	66	78	58	271	93	156	127	215	71	72	89
26	82	67	76	60	250	93	155	126	196	79	72	95
27	83	68	74	64	231	95	147	128	179	80	80	106
28	84	71	70	65	214	95	151	126	163	169	85	107
29	85	74	68	65	---	94	184	121	150	316	97	109
30	85	75	66	64	---	95	183	142	138	425	99	137
31	83	---	65	62	---	96	---	149	---	468	122	---
TOTAL	2415	2087	2936	1855	3745	3763	4009	4567	6706	3618	4575	3544
MEAN	77.9	69.6	94.7	59.8	134	121	134	147	224	117	148	118
MAX	87	82	135	65	298	199	189	184	442	468	464	146
MIN	68	65	65	58	56	93	91	118	129	53	72	89
CFSM	.74	.66	.89	.56	1.26	1.14	1.26	1.39	2.11	1.10	1.40	1.11
IN.	.85	.73	1.03	.65	1.31	1.32	1.41	1.60	2.35	1.27	1.61	1.24

CAL YR 1980 TOTAL 39835 MEAN 109 MAX 370 MIN 52 CFSM 1.03 IN 13.98
WTR YR 1981 TOTAL 43820 MEAN 120 MAX 468 MIN 53 CFSM 1.13 IN 15.38

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW¼NW¼ sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) downstream from dam for Lime Lake, 30 ft (9 m) upstream from bridge on Orland Road, and 0.7 mile (1.1 km) northwest of Panama.

DRAINAGE AREA.--17.5 mi² (45.3 km²), of which 3.68 mi² (9.53 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft (289.560 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records poor except those for winter periods which are poor. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--12 years, 7.06 ft³/s (0.200 m³/s), 5.48 in/yr (139 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 38 ft³/s (1.08 m³/s) June 14, 1981, gage height, 4.62 ft (1.408 m); no flow at times during 1971 and 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 38 ft³/s (1.08 m³/s) June 14, gage height, 4.62 ft (1.408 m); minimum daily, 0.03 ft³/s (0.001 m³/s) October 11-15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.3	1.2	3.2	8.2	9.1	9.1	8.9	23	13	13	29	6.5
2	8.1	1.3	4.1	8.2	8.9	9.0	8.7	23	7.7	9.9	27	17
3	7.8	1.8	4.2	7.9	8.5	9.0	8.7	24	.70	11	26	25
4	7.5	1.8	4.1	7.6	7.5	9.1	9.0	25	.80	12	25	25
5	7.1	1.9	4.0	7.2	6.8	8.8	21	25	1.3	13	23	24
6	6.9	2.0	4.0	7.5	6.2	8.6	22	25	1.8	14	11	22
7	6.5	2.0	4.5	7.7	6.0	8.4	21	25	1.9	14	6.5	21
8	2.3	2.3	8.4	7.7	5.8	8.1	19	25	2.2	14	6.8	20
9	.05	2.1	9.3	7.6	6.2	7.8	17	25	3.4	13	7.1	19
10	.04	1.9	8.9	7.3	8.0	7.6	17	26	4.8	12	7.1	18
11	.03	1.9	8.6	7.1	9.9	7.6	16	27	4.9	12	7.0	17
12	.03	2.0	8.5	6.9	11	7.2	16	26	5.2	11	6.6	16
13	.03	2.0	7.9	6.8	10	7.1	16	26	12	12	6.2	15
14	.03	2.2	7.8	6.7	9.5	7.0	21	26	31	9.8	5.9	15
15	.03	2.3	7.6	6.6	10	7.1	21	27	37	7.8	6.9	14
16	.05	2.3	7.3	6.6	11	7.2	20	27	36	6.4	6.4	13
17	.22	2.2	7.1	6.6	13	7.4	20	26	35	5.5	5.8	13
18	.27	2.1	6.8	6.5	14	7.8	19	25	33	4.9	5.3	12
19	.28	2.1	6.6	6.4	15	8.3	19	24	32	5.5	4.9	12
20	.32	2.3	6.5	6.4	15	8.8	18	23	31	8.9	4.5	11
21	.29	2.0	6.6	6.4	14	9.0	18	22	32	8.8	4.3	11
22	.34	2.2	6.4	6.4	13	9.2	17	21	34	7.8	3.9	10
23	.44	2.0	6.2	6.4	12	9.3	19	20	33	7.1	3.7	10
24	.56	2.0	6.1	6.4	11	9.1	18	19	33	6.3	3.4	10
25	.64	2.0	6.0	6.6	10	8.8	18	19	32	5.9	2.9	9.9
26	.56	2.0	6.0	6.7	9.9	8.7	18	17	30	16	2.6	9.9
27	.69	2.7	6.2	7.0	9.6	8.6	17	17	29	16	4.4	10
28	.96	3.2	6.6	7.2	9.4	8.4	19	17	27	27	4.6	10
29	1.1	3.1	7.4	7.6	---	8.6	22	16	26	34	5.9	10
30	1.2	3.3	8.0	8.2	---	8.8	22	17	25	33	6.4	11
31	1.2	---	8.2	8.9	---	9.2	---	15	---	31	6.7	---
TOTAL	63.86	64.2	203.1	221.3	280.2	258.5	526.3	703	596.10	402.6	276.8	437.3
MEAN	2.06	2.14	6.55	7.14	10.0	8.34	17.5	22.7	19.9	13.0	8.93	14.6
MAX	8.3	3.3	9.3	8.9	15	9.3	22	27	37	34	29	25
MIN	.03	1.2	3.2	6.4	5.8	7.0	8.7	15	.70	4.9	2.6	6.5
CFSM	.12	.12	.37	.41	.57	.48	1.00	1.30	1.14	.74	.51	.83
IN.	.14	.14	.43	.47	.60	.55	1.12	1.49	1.27	.86	.59	.93

CAL YR 1980 TOTAL 2930.94 MEAN 8.01 MAX 27 MIN .03 CFSM .46 IN 6.23
WTR YR 1981 TOTAL 4033.24 MEAN 11.0 MAX 37 MIN .03 CFSM .63 IN 8.57

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW¼ sec. 6, T.8 S., R.12 W., Michigan Meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft (152 m) upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi (0.6 km) downstream from Michigan Power Co. hydroelectric plant, 4 mi (6 km) upstream from Pigeon River, and at mile 96 (154 km).

DRAINAGE AREA.--1,866 mi² (4,833 km²).

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft (230.22 m) Michigan Power Co. datum. Prior to Oct. 1, 1951, at site 0.4 mi (0.6 km) upstream at datum 4.2 ft (1.28 m) higher.

REMARKS.--Records good. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--58 years, 1,561 ft³/s (44.21 m³/s), 11.36 in/yr (289 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 27, 1950, gage height, 10.76 ft (3.280 m), present datum; minimum daily, 39 ft³/s (1.10 m³/s) Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,920 ft³/s (139 m³/s) Feb. 24, gage height, 6.56 ft (1.999 m); minimum, 200 ft³/s (5.66 m³/s) Jan. 27, gage height, 1.50 ft (0.457 m); minimum daily, 1,020 ft³/s (28.9 m³/s) July 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1780	1470	1670	1550	1310	4040	1900	3640	3280	2720	4210	2510
2	1680	1570	1420	1670	1520	3630	1580	3950	3740	2550	4370	2670
3	1640	1720	1760	1660	1420	3640	1800	3730	3530	2180	4230	2620
4	1660	1480	1550	1710	1190	3490	1630	3470	3290	2090	3980	2580
5	1640	1350	1890	1630	1260	3290	1650	3300	3120	2120	3830	2450
6	1620	1480	1830	1370	1300	3170	1810	3150	2780	2220	3510	2370
7	1550	1460	1960	1290	1360	3020	1540	2890	2680	1870	3460	2350
8	1520	1330	1870	1370	1450	2790	1630	2630	2470	1610	3310	2380
9	1510	1470	2000	1490	1490	2740	1670	2320	2590	1750	2920	2400
10	1560	1630	2310	1530	1370	2660	1740	2640	2640	1710	2890	2220
11	1570	1490	2370	1900	1340	2570	1670	2820	2700	1450	2680	2210
12	1550	1130	2510	1820	1590	2400	1770	2920	2400	1510	2560	1970
13	1410	1370	2530	1710	1520	2280	2080	3030	2920	1560	2270	1970
14	1270	1510	2490	1410	1450	2340	2220	3220	3530	1550	1990	1980
15	1350	1470	2380	1220	1420	2320	2300	3150	3620	1250	2070	2140
16	1490	1160	2170	1170	1660	2220	2440	3140	4320	1230	2020	2060
17	1840	1340	2220	1270	1700	2240	2410	3110	4510	1100	1810	1860
18	1750	1520	1920	1470	1990	2000	2530	3020	4380	1020	1900	1850
19	1520	1150	2020	1600	2580	1950	2520	2940	4360	1170	1810	1760
20	1370	1260	1820	1370	3450	1820	2500	2920	4180	1110	1800	1970
21	1480	1460	1840	1350	4330	1930	2320	2800	4080	1300	1730	1940
22	1550	1410	1730	1500	4380	1900	2350	2670	3940	1500	1610	1840
23	1550	1240	1680	1650	4580	1960	2480	2520	3840	1640	1580	1960
24	1740	1210	1630	1540	4810	1910	2530	2380	3450	1730	1330	1840
25	1550	1300	1420	1270	4760	1730	2630	2520	3760	1720	1350	1920
26	1530	1640	1730	1520	4490	1730	2760	2420	3530	1790	1260	1910
27	1640	1470	1720	1350	4400	1780	2800	2420	3260	1640	1330	2120
28	1540	1180	1530	1470	4250	1740	2760	2390	3000	2280	1470	2210
29	1570	1330	1420	1620	---	1620	3460	2200	2820	2650	1430	1970
30	1510	1400	1630	1370	---	1730	3410	2880	2410	3400	1610	2560
31	1570	---	1590	1230	---	1970	---	3020	---	4070	2490	---
TOTAL	48510	42000	58610	46080	68370	74590	66890	90210	101130	57690	74810	64590
MEAN	1565	1400	1891	1486	2442	2406	2230	2910	3371	1861	2413	2153
MAX	1840	1720	2530	1900	4810	4040	3460	3950	4510	4070	4370	2670
MIN	1270	1130	1420	1170	1190	1620	1540	2200	2400	1020	1260	1760
CFSM	.84	.75	1.01	.80	1.31	1.29	1.20	1.56	1.81	1.00	1.29	1.15
IN.	.97	.84	1.17	.92	1.36	1.49	1.33	1.80	2.02	1.15	1.49	1.29

CAL YR 1980 TOTAL 770010 MEAN 2104 MAX 5650 MIN 1130 CFSM 1.13 IN 15.35
WTR YR 1981 TOTAL 793480 MEAN 2174 MAX 4810 MIN 1020 CFSM 1.17 IN 15.82

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE¼NW¼ sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from bridge on County Road 750 North, 1,200 ft (366 m) downstream from Page ditch, 0.7 mile (1.1 km) south of Indiana-Michigan State line, and 1.2 miles (1.9 km) northwest of Scott.

DRAINAGE AREA.--361 mi² (935 km²), of which 53.9 mi² (139.6 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft (248.412 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

AVERAGE DISCHARGE.--13 years, 345 ft³/s (9.770 m³/s), 12.98 in/yr (330 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,980 ft³/s (56.1 m³/s) June 15, 1981, gage height, 7.27 ft (2.216 m); minimum daily, 42 ft³/s (1.19 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,980 ft³/s (56.1 m³/s) June 15, gage height, 7.27 ft (2.216 m); minimum daily, 167 ft³/s (4.73 m³/s) Nov. 12, 21, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	229	182	187	237	211	1050	317	789	510	913	1100	818
2	225	179	216	233	222	1010	304	812	463	834	992	933
3	223	177	245	230	260	956	297	831	446	764	929	744
4	218	177	231	228	240	910	307	830	447	709	905	699
5	212	177	219	226	231	858	348	820	439	650	851	849
6	205	177	220	224	224	795	328	801	519	598	761	776
7	201	177	230	232	221	736	311	760	742	548	692	695
8	197	176	308	231	230	680	302	708	737	504	634	691
9	192	177	477	228	239	633	314	655	741	468	590	688
10	187	172	555	225	230	593	330	660	901	438	553	657
11	184	168	468	225	241	559	332	722	1020	407	513	615
12	181	167	421	221	232	533	343	750	1010	388	479	571
13	179	169	405	219	231	505	355	677	1090	379	443	534
14	177	175	399	221	228	478	435	631	1450	357	426	502
15	176	181	387	225	288	456	563	670	1920	333	440	471
16	177	177	374	227	351	436	614	760	1870	320	443	443
17	185	172	357	226	452	416	568	764	1610	309	410	416
18	205	172	340	230	592	398	573	691	1470	292	376	412
19	189	172	328	232	727	382	602	639	1370	289	351	392
20	184	170	311	237	854	358	612	599	1290	354	334	369
21	178	167	296	237	910	357	604	561	1280	427	318	349
22	175	169	287	236	948	350	584	529	1520	443	303	339
23	169	169	280	229	1010	339	614	503	1600	453	294	328
24	169	171	275	227	1090	330	649	492	1470	483	284	316
25	177	169	262	221	1130	322	622	506	1370	510	273	308
26	185	167	254	222	1130	320	568	518	1320	804	271	307
27	181	170	249	225	1110	340	539	483	1260	1360	310	429
28	184	186	244	220	1080	333	536	476	1160	1620	359	515
29	190	192	240	215	---	318	604	464	1070	1580	360	452
30	188	187	247	211	---	324	726	583	990	1490	379	526
31	185	---	241	213	---	330	---	581	---	1250	627	---
TOTAL	5907	5241	9553	7013	14912	16405	14201	20265	33085	20274	16000	16144
MEAN	191	175	308	226	533	529	473	654	1103	654	516	538
MAX	229	192	555	237	1130	1050	726	831	1920	1620	1100	933
MIN	169	167	187	211	211	318	297	464	439	289	271	307
CFSM	.53	.49	.85	.63	1.48	1.47	1.31	1.81	3.06	1.81	1.43	1.49
IN.	.61	.54	.98	.72	1.54	1.69	1.46	2.09	3.41	2.09	1.65	1.66

CAL YR 1980 TOTAL 123371 MEAN 337 MAX 966 MIN 163 CFSM .93 IN 12.71
WTR YR 1981 TOTAL 179000 MEAN 490 MAX 1920 MIN 167 CFSM 1.36 IN 18.45

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE1/4NW1/4 sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft (396 m) downstream from Boyd ditch, 1.7 miles (2.7 km) upstream from Hustin ditch, and 3.1 miles (5.0 km) downstream from Waldron Lake.

DRAINAGE AREA.--142 mi^2 (368 km^2).

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 miles (5.0 km) upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft (268.261 m) National Geodetic Vertical Datum of 1929 (levels by State of Indiana, Department of Natural Resources).

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--10 years, 131 ft^3/s (3.710 m^3/s), 12.53 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 682 ft^3/s (19.3 m^3/s) Apr. 7, 1978, gage height, 7.41 ft (2.258 m); minimum daily, 2.4 ft^3/s (0.068 m^3/s) Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 568 ft^3/s (16.1 m^3/s) June 16 gage height, 7.42 ft (2.262 m); minimum daily, 35 ft^3/s (0.99 m^3/s) Aug. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	66	60	97	73	400	111	373	232	345	242	69
2	148	64	68	96	70	394	107	383	225	327	236	72
3	153	62	76	94	79	388	99	386	217	311	234	90
4	157	59	78	90	78	377	98	383	211	296	227	163
5	159	58	80	90	74	365	96	379	219	280	219	183
6	158	57	80	89	77	346	91	372	262	265	209	184
7	156	56	83	88	75	327	85	357	285	250	198	178
8	153	55	115	88	73	312	80	340	297	237	188	171
9	157	54	139	88	71	298	80	324	331	223	179	162
10	156	52	149	86	68	284	83	329	368	209	169	152
11	152	52	153	86	78	269	89	343	383	195	159	142
12	148	51	154	86	87	254	94	337	386	183	148	133
13	140	50	154	85	98	242	98	328	431	172	138	125
14	133	52	153	83	98	228	177	331	507	161	129	118
15	124	54	153	82	102	215	241	363	551	148	124	111
16	116	54	150	81	109	205	252	376	566	137	120	103
17	115	54	146	81	149	193	251	375	565	128	114	97
18	112	54	142	80	219	184	262	367	553	120	106	91
19	108	52	139	80	282	174	257	353	537	117	98	82
20	101	52	136	78	320	167	250	336	519	146	92	77
21	95	50	128	78	344	161	240	320	497	181	86	73
22	89	50	116	79	360	153	232	305	491	187	81	70
23	83	50	104	78	375	146	231	290	481	184	76	65
24	78	50	95	76	389	139	227	276	465	179	71	62
25	75	50	100	74	398	132	222	264	453	172	68	61
26	73	49	97	73	399	126	214	251	436	197	65	61
27	71	52	93	71	400	124	207	249	415	212	69	86
28	72	55	90	71	400	120	231	246	395	230	56	100
29	71	56	98	72	---	117	314	239	377	243	35	99
30	70	58	99	73	---	116	352	242	360	246	48	107
31	67	---	98	75	---	115	---	239	---	246	61	---
TOTAL	3636	1628	3526	2548	5345	7071	5371	10056	12015	6527	4045	3287
MEAN	117	54.3	114	82.2	191	228	179	324	401	211	130	110
MAX	159	66	154	97	400	400	352	386	566	345	242	184
MIN	67	49	60	71	68	115	80	239	211	117	35	61
CFSM	.82	.38	.80	.58	1.35	1.61	1.26	2.28	2.82	1.49	.92	.78
IN.	.95	.43	.92	.67	1.40	1.85	1.41	2.63	3.15	1.71	1.06	.86

CAL YR 1980 TOTAL 49326 MEAN 135 MAX 344 MIN 38 CFSM .95 IN 12.92
WTR YR 1981 TOTAL 65055 MEAN 178 MAX 566 MIN 35 CFSM 1.25 IN 17.04

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE¼NE¼ sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from River Avenue bridge at Goshen, 0.4 mile (0.6 km) upstream from Rock Run, and at mile 16.1 (25.9 km).

DRAINAGE AREA.--594 mi² (1,538 km²).

PERIOD OF RECORD.--
WATER DISCHARGE: April 1931 to current year.

REVISED RECORDS.-WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft (234.522 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter periods, which are fair.

AVERAGE DISCHARGE.--50 years, 507 ft³/s (14.36 m³/s), 11.59 in/yr (294 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,440 ft³/s (154 m³/s) Apr. 4, 1950, gage height, 10.15 ft (3.094 m); maximum gage height, 10.33 ft (3.149 m) July 10, 1951 and Mar. 5, 1979; minimum daily discharge, 7.0 ft³/s (0.20 m³/s) Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,800 ft³/s (51.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 20	0100	2,420	68.5	6.50	1.981	May 16	1000	2,300	65.1	6.28	1.914
Apr. 15	1400	1,890	53.5	5.58	1.701	June 14	2200	*3,480	98.6	*8.26	2.518
Apr. 30	0100	2,010	56.9	5.78	1.762	July 2	0400	1,910	54.1	5.61	1.710
May 11	2400	2,000	56.6	5.77	1.759	July 26	2400	2,790	79.0	7.14	2.176

Minimum daily discharge, 190 ft³/s (5.38 m³/s).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	376	260	247	343	333	1340	378	1600	942	1480	769	397
2	353	244	307	332	364	1260	374	1470	864	1700	709	372
3	357	248	390	320	312	1170	365	1400	825	1260	684	391
4	349	241	374	292	299	1100	377	1320	790	1090	660	526
5	345	243	347	280	292	1050	379	1260	788	959	621	612
6	349	227	350	293	289	999	366	1210	938	869	595	609
7	333	234	348	312	282	935	357	1150	950	796	562	620
8	329	221	628	299	280	883	347	1080	922	737	515	656
9	317	215	1070	287	278	837	377	1030	1110	686	488	649
10	325	210	1010	280	293	799	376	1140	1380	639	459	630
11	298	215	762	305	317	765	418	1740	1360	595	437	605
12	302	196	644	301	348	730	441	1870	1220	570	409	573
13	304	197	606	300	371	698	468	1540	1560	556	394	538
14	293	215	598	298	381	666	970	1350	2940	520	378	504
15	292	217	568	288	388	639	1780	1750	3120	492	379	470
16	288	215	552	283	423	617	1580	2240	2560	481	369	441
17	302	222	527	280	811	593	1390	1930	2270	455	352	422
18	309	207	475	301	1790	574	1430	1610	2060	430	331	405
19	295	204	395	286	2330	558	1560	1430	1920	428	317	382
20	301	197	332	281	2290	544	1500	1340	1850	581	304	359
21	278	202	317	283	1970	526	1440	1270	1760	644	294	342
22	275	190	310	286	1790	510	1380	1200	1740	591	278	326
23	258	190	304	288	1740	495	1420	1120	1720	578	269	314
24	267	193	338	286	1720	483	1480	1060	1620	558	266	309
25	277	192	318	298	1640	469	1250	1030	1610	541	254	294
26	267	195	309	326	1550	464	1090	987	1500	2130	259	300
27	268	194	301	359	1440	461	1000	963	1400	2360	285	846
28	264	216	299	377	1380	419	1060	1010	1320	1810	289	709
29	271	221	331	377	---	401	1740	977	1230	1710	280	472
30	261	220	351	329	---	399	1900	981	1220	1150	256	531
31	271	---	357	297	---	394	---	1030	---	873	456	---
TOTAL	9374	6441	14065	9467	25701	21778	28993	41088	45489	28269	12918	14604
MEAN	302	215	454	305	918	703	966	1325	1516	912	417	487
MAX	376	260	1070	377	2330	1340	1900	2240	3120	2360	769	846
MIN	258	190	247	280	278	394	347	963	788	428	254	294
CFSM	.51	.36	.76	.51	1.55	1.18	1.63	2.23	2.55	1.54	.70	.82
IN.	.59	.40	.88	.59	1.61	1.36	1.82	2.57	2.85	1.77	.81	.91

CAL YR 1980 TOTAL 194732 MEAN 532 MAX 2210 MIN 190 CFSM .90 IN 12.20
WTR YR 1981 TOTAL 258187 MEAN 707 MAX 3120 MIN 190 CFSM 1.19 IN 16.17

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW¼NE¼ sec.5, T.37 N., R.5 E., Elkhrt County, Hydrologic Unit 04050001, on left bank 200 ft (61 m) downstream from mouth of Elkhart River, 200 ft (61 m) upstream from Main Street bridge in Elkhart, 2,000 ft (610 m) downstream from Christiana Creek, 0.5 mile (0.8 km) downstream from Elkhart Hydroelectric Plant, and at mile 76.5 (123.1 km).

DRAINAGE AREA.--3,370 mi^2 (8,728 km^2).

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile (1.3 km) downstream at different datum from September 1924 to March 1926 are available in the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft (213.360 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. The flow is regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--34 years, 3,122 ft^3/s (88.42 m^3/s), 12.58 in/yr (320 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,400 ft^3/s (521 m^3/s) Apr. 5, 1950, gage height, 27.82 ft (8.480 m); minimum daily, 336 ft^3/s (9.52 m^3/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 11,600 ft^3/s (328 m^3/s) June 14, gage height, 24.40 ft (7.437 m); minimum daily, 1,960 ft^3/s (55.5 m^3/s) Feb. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2860	2510	2620	2870	2490	7380	3110	6970	5900	6200	7110	4440
2	2710	2270	2600	2890	2560	6830	2890	7100	6240	6300	7180	4540
3	2640	2620	2980	2730	2230	4580	3190	6920	6020	5280	6980	4570
4	2670	2340	2850	2360	1960	6410	3030	6790	5640	4920	6610	4700
5	2620	2310	3030	2280	2430	6120	2980	6320	5390	4700	6320	4590
6	2590	2150	2970	2370	2670	5890	2810	5760	5360	4700	5940	4450
7	2550	2490	3220	2310	2740	5660	2760	5630	5150	4220	5760	4460
8	2450	2150	3720	2290	2770	5310	2740	5310	5060	3750	5520	4490
9	2410	2290	4440	2380	2820	5080	2990	4990	5780	3650	5120	4680
10	2960	2550	4700	2110	2700	4960	2950	5410	6330	3650	4860	4250
11	2500	2170	4380	2450	2720	4810	3040	6460	6180	3260	4660	3680
12	2480	2190	4500	2810	2790	4520	3110	6570	5770	3190	4420	3900
13	2390	2100	4340	2510	2860	4340	3590	6360	6960	3270	4070	4000
14	2300	2270	4290	2710	2870	4290	4470	6310	9870	3140	3670	3550
15	2230	2470	4160	2210	2870	4200	5390	6660	10600	2800	3680	3420
16	2210	2050	3910	2290	2980	4120	5450	7220	9990	2990	3640	4050
17	2490	2120	3680	2190	4100	3880	5310	6900	10000	2550	3370	3250
18	2350	2310	3590	2390	5480	3720	5290	6430	9360	2300	3370	2910
19	2580	2140	3570	2530	6810	3550	5490	6050	8910	2480	3100	3140
20	2200	2060	3190	2660	7580	3550	5400	5830	8550	2700	3090	3370
21	2350	2200	2710	2400	8120	3500	5160	5600	8270	2730	3030	3490
22	2570	2340	2950	2490	8010	3420	5110	5310	8210	3010	2730	3150
23	2260	2090	3120	2720	8230	3210	5520	5090	8070	3050	2890	3090
24	2480	2110	3220	2730	8390	3470	5540	4860	7770	3180	2440	3080
25	2560	2100	2590	2360	8010	3250	5380	5000	7900	3240	2480	2590
26	2310	2410	2340	2630	8070	3120	5290	4790	7580	6330	2410	3040
27	2540	2430	3030	2710	7810	3190	5200	4630	6980	7970	2570	4730
28	2520	2100	2690	2460	7630	3100	5240	4690	6580	6260	2730	4580
29	2450	2260	2620	2940	---	3000	6780	4550	6170	6280	2680	3810
30	2330	2330	3100	2580	---	3000	7130	5880	5790	6920	2850	3660
31	2360	---	2900	2140	---	3270	---	5950	---	6940	4310	---
TOTAL	76920	67930	104010	77500	130700	136730	132340	182340	216380	131960	129590	115660
MEAN	2481	2264	3355	2500	4668	4411	4411	5882	7213	4257	4180	3855
MAX	2960	2620	4700	2940	8390	7380	7130	7220	10600	7970	7180	4730
MIN	2200	2050	2340	2110	1960	3000	2740	4550	5060	2300	2410	2590
CFSM	.74	.67	1.00	.74	1.39	1.31	1.31	1.75	2.14	1.26	1.24	1.14
IN.	.85	.75	1.15	.86	1.44	1.51	1.46	2.01	2.39	1.46	1.43	1.28

CAL YR 1980 TOTAL 1339300 MEAN 3659 MAX 8280 MIN 1930 CFSM 1.09 IN 14.78
WTR YR 1981 TOTAL 1502060 MEAN 4115 MAX 10600 MIN 1960 CFSM 1.22 IN 16.58

04101500 ST. JOSEPH RIVER AT NILES, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°49'45", long 86°15'35", in SW¼ sec. 26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft (30 m) upstream from Main Street Bridge at Niles, 0.6 mi (1.0 km) downstream from dam at French Paper Co., 1 mi (2 km) upstream from Dowagiac River, and at mile 44 (71 km).

DRAINAGE AREA.--3,666 mi² (9,495 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft (192.944 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, at datum 2.00 ft (0.610 m) higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft (15 m) upstream from present site (gage heights referred to NGVD). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi (1.8 km) downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi (13 km) downstream from base gage at different datum.

REMARKS.--Water-discharge records good. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--51 years, 3,208 ft³/s (90.85 m³ /s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 ft³/s (572 m³/s) Apr. 5, 1950, gage height, 15.10 ft (4.602 m), present datum; minimum daily, 420 ft³/s (11.9 m³/s) Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,900 ft³/s (365 m³/s) June 15, gage height, 11.78 ft (3.591 m); minimum daily, 2,040 ft³/s (57.77 m³/s) Nov. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3190	2720	2540	3150	2730	7570	3620	7290	6050	5850	8020	4780
2	2960	2340	3130	2820	2710	7140	3420	7180	6280	6690	7500	4460
3	2970	2960	2910	3100	2240	6700	2790	7280	6390	6020	7520	5100
4	2810	2620	3300	2470	2240	6660	3380	6810	6080	5280	6820	4710
5	2920	2650	2800	2380	2200	6280	2850	6610	5580	5180	6390	4920
6	2810	2080	3390	2600	2690	6080	3800	6100	5500	4990	6370	4350
7	2740	2720	3310	2440	2680	5870	2300	5680	5420	4560	5820	4830
8	2750	2430	4120	2420	2590	5610	3150	5560	5410	4000	5920	4650
9	2640	2370	4810	2520	2660	5210	2870	5230	6310	3800	5440	4470
10	2860	2570	5150	2250	3000	5130	3170	5620	7040	3700	5010	4570
11	2980	2480	4700	2690	2620	5050	3230	7520	6690	3500	5020	3850
12	2570	2640	4680	2980	2560	4780	3170	7630	6220	3300	4590	4160
13	2800	2040	4590	2680	3030	4520	3650	6930	7380	3400	4460	3940
14	2370	2460	4300	2840	2920	4480	4730	6630	11600	3300	4050	3980
15	2600	2620	4360	2330	2950	4410	5690	7150	12700	3000	3990	3550
16	2350	2390	4110	2480	3070	4400	6040	7760	11300	2700	3900	3840
17	3140	2180	3790	2240	4070	3940	5260	7440	10800	2490	3790	4200
18	2170	2330	3990	2380	6360	4310	5400	6980	10200	2350	3600	3120
19	2730	2440	3480	2560	8140	3880	5550	6290	9430	2910	3800	3210
20	2710	2230	3430	2730	8530	3790	5540	6090	9110	3350	3360	3310
21	2380	2220	3040	2610	8680	3420	5420	5810	8700	3290	3460	3750
22	2620	2500	2900	2490	8670	3660	5100	5680	8600	3610	2840	3500
23	3030	2450	3330	2790	8500	3770	6040	5390	8470	3280	2990	3250
24	2150	2090	3330	2890	8650	3660	5940	5140	8130	3540	3290	2990
25	2970	2400	2920	2740	8540	3440	5770	5150	8290	3570	2460	3470
26	2520	2160	2390	2560	8300	3160	5410	5170	8250	7660	2530	3040
27	2720	2890	2980	2920	8100	3450	5410	4940	7380	10900	3370	5050
28	2810	2520	2770	2680	7770	3260	5510	4750	7000	10900	2990	5350
29	2770	2220	3000	3070	---	3200	6760	5040	6330	10700	3000	4680
30	2510	2530	3000	2710	---	3150	7580	7240	6430	8870	3140	4000
31	2510	---	2900	2440	---	3440	---	6570	---	7970	3960	---
TOTAL	84060	73250	109450	81960	137200	143420	138550	194660	233070	154660	139400	123080
MEAN	2712	2442	3531	2644	4900	4626	4618	6279	7769	4989	4497	4103
MAX	3190	2960	5150	3150	8680	7570	7580	7760	12700	10900	8020	5350
MIN	2150	2040	2390	2240	2200	3150	2300	4750	5410	2350	2460	2990
CFSM	.74	.67	.96	.72	1.34	1.26	1.26	1.71	2.12	1.36	1.23	1.12
IN.	.85	.74	1.11	.83	1.39	1.46	1.41	1.98	2.37	1.57	1.41	1.25

CAL YR 1980 TOTAL 1436550 MEAN 3925 MAX 8900 MIN 2040 CFSM 1.07 IN 14.58
WTR YR 1981 TOTAL 1612760 MEAN 4419 MAX 12700 MIN 2040 CFSM 1.21 IN 16.37

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURE: February 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since Oct. 9, 1980.

REMARKS.--In addition to water-quality monitor, water temperature readings and specific conductance samples were collected by a local observer in an approximate twice-weekly basis. Interruptions in the daily record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded (water years 1979, 1981), 644 micromhos Feb. 11, 1981; minimum daily (water years 1979, 1981), 310 micromhos, Mar. 4, 1979.
WATER TEMPERATURES: Maximum daily recorded (water years 1979 -1981), 29.0°C July 20, 21, 1980; minimum daily recorded (water years 1979-81), 0.0°C on several days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
NOV												
05...	1315	2520	570	7.6	7.5	12.1	103	300	K50	270	35	73
JAN												
14...	1300	3040	637	7.8	.5	14.8	106	720	1200	280	42	76
MAR												
25...	1145	3020	581	--	7.0	12.8	106	--	--	280	--	76
MAY												
20...	1315	5940	440	7.9	15.0	9.7	97	--	K60	250	29	69
JUL												
29...	0930	11100	353	7.7	19.5	9.2	101	--	K10000	160	37	45
SEP												
30...	1030	4290	422	8.1	17.0	9.2	97	--	--	220	31	61

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCT/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
NOV											
05...	20	12	9	.3	2.1	--	280	0	230	11	40
JAN											
14...	21	13	9	.3	2.7	2.0	290	0	238	7.4	49
MAR											
25...	21	11	8	.3	2.1	1.6	--	--	--	--	40
MAY											
20...	18	8.7	7	.2	2.1	1.6	270	0	221	4.7	41
JUL											
29...	12	6.6	8	.2	3.0	2.2	150	0	123	4.3	27
SEP											
30...	17	7.6	7	.2	2.6	--	230	0	189	2.8	37

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
NOV											
05...	23	.1	7.1	343	322	2330	1.4	1.4	.380	.400	.52
JAN											
14...	24	.2	8.4	366	343	3000	1.7	1.1	.640	.440	.57
MAR											
25...	20	.2	6.4	335	--	2730	1.7	1.7	.340	.350	.45
MAY											
20...	19	.2	4.5	318	284	5100	1.8	1.7	.070	.080	.10
JUL											
29...	9.8	.1	6.8	234	183	7010	1.9	1.5	--	.190	.24
SEP											
30...	18	.2	7.5	285	265	3300	1.3	1.3	--	.290	.37

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 05...	.62	1.00	2.4	11	.040	.12	.010	5.3	10	68	100
JAN 14...	.46	1.10	2.8	12	.030	.09	.010	--	10	82	100
MAR 25...	.48	.82	2.5	11	.050	.15	.020	4.5	8	65	100
MAY 20...	.63	.70	2.5	11	.070	.21	<.010	--	--	--	--
JUL 29...	--	1.40	3.3	15	.290	.89	.080	--	159	4770	--
SEP 30...	--	1.20	2.5	11	.120	.37	.050	--	29	336	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)
JAN 14...	1300	1	2	--	60	0	<1	20	10	1	1
MAY 20...	1315	1	1	100	50	1	<1	--	20	1	0
JUL 29...	0930	3	2	100	40	1	<1	10	<10	3	5
SEP 30...	1030	4	3	100	10	1	1	10	<10	6	2

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)
JAN 14...	8	0	240	<10	5	5	50	40	<.1	<.1
MAY 20...	11	3	580	<10	3	3	70	5	.2	.2
JUL 29...	16	4	4000	50	9	2	190	2	.2	<.1
SEP 30...	15	5	820	14	3	3	70	6	.2	<.1

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
JAN 14...	5	4	0	0	0	0	30	5	--	.2
MAY 20...	38	2	0	0	0	0	50	<4	6.1	.6
JUL 29...	9	6	0	0	<1	0	50	<4	5.6	5.2
SEP 30...	6	3	<1	<1	<1	<1	30	5	6.0	1.6

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 5,80	MAR 25,81	MAY 20,81	JUL 29,81	SEP 30,81
TIME	1315	1145	1315	0930	1030
TOTAL CELLS/ML	3700	7800	24000	6000	6300
DIVERSITY: DIVISION	1.8	1.1	1.4	1.6	1.3
.CLASS	1.8	1.1	1.4	1.6	1.3
..ORDER	2.5	1.7	1.9	2.5	2.1
...FAMILY	3.1	2.0	2.0	3.1	2.4
....GENUS	3.5	2.0	2.3	3.5	3.2

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	--	-	*	0	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	41	1
...COCCOMYXACEAE										
....ELAKATOTHRIX	980#	26	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	64	2	--	-	560	2	85	1	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	77	2	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	*	0	64	1	280	1	43	1	160	3
....CLOSTERIOPSIS	*	0	--	-	--	-	--	-	--	-
....OOCYSTIS	*	0	--	-	--	-	150	2	--	-
....SELENASTRUM	26	1	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	230	4	--	-
...SCENEDESMACEAE										
....COELASTRUM	--	-	--	-	--	-	110	2	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	330	5
....SCENEDESMUS	180	5	--	-	560	2	530	9	410	7
....TETRASTRUM	--	-	250	3	--	-	85	1	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	140	2
....CHLAMYDOMONAS	64	2	640	8	280	1	110	2	61	1
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	43	1	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	390	10	--	-	13000#	54	620	10	760	12
....MELOSIRA	--	-	--	-	1800	8	580	10	2200#	36
....STEPHANODISCUS	270	7	4900#	63	--	-	*	0	--	-
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	*	0	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	*	0
....CYMBELLA	--	-	--	-	--	-	64	1	61	1
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	43	1	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	270	7	510	7	--	-	--	-	550	9
....FRAGILARIA	230	6	--	-	--	-	110	2	100	2
....SYNEDRA	64	2	190	2	420	2	64	1	200	3
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	64	1	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	77	2	450	6	--	-	64	1	41	1
...NITZSCHIACEAE										
....NITZSCHIA	*	0	--	-	280	1	85	1	61	1
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	51	1	--	-	840	3	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	39	1	--	-	140	1	64	1	--	-

04101590 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 5,80 1315		MAR 25,81 1145		MAY 20,81 1315		JUL 29,81 0930		SEP 30,81 1030	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	530	14	250	3	2500	10	550	9	--	-
..NOSTOCALES										
...HAMMATOIDEACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	300	5	--	-
...NOSTOCACEAE										
....ANARAENA	--	-	--	-	--	-	--	-	310	5
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	260	7	--	-	3100	13	2000#	33	720	11
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	*	0	--	-
....TRACHELOMONAS	100	3	510	7	280	1	*	0	61	1

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	566	562	564	591	562	580	616	606	611
2	---	---	---	568	564	566	578	558	566	609	600	604
3	---	---	---	574	562	567	567	559	564	601	589	594
4	---	---	---	575	564	569	573	568	570	599	594	596
5	---	---	---	578	568	574	576	573	575	604	565	599
6	---	---	---	596	576	581	572	565	568	602	461	568
7	---	---	---	595	578	584	576	562	571	607	598	603
8	---	---	---	585	580	584	561	537	549	614	607	611
9	551	547	549	587	580	584	546	538	543	616	603	611
10	555	551	553	582	580	581	535	513	520	612	604	609
11	560	549	553	586	579	581	526	521	524	614	605	610
12	566	552	559	589	579	584	537	527	530	609	586	601
13	558	550	554	595	580	586	544	533	540	604	591	600
14	562	556	560	591	579	584	548	544	546	609	600	603
15	563	556	561	584	577	580	549	546	548	606	601	604
16	570	551	563	582	578	580	551	549	550	614	603	607
17	566	547	558	586	565	575	557	552	554	609	605	607
18	563	547	555	585	581	582	561	554	558	613	600	608
19	566	554	560	586	581	584	565	559	562	607	600	603
20	561	556	559	587	583	585	570	560	564	604	591	598
21	563	554	558	593	583	588	575	571	573	603	592	597
22	575	555	561	586	582	584	580	557	573	595	591	593
23	568	554	560	588	580	582	568	560	563	593	590	591
24	569	549	563	590	581	585	587	573	578	588	586	587
25	572	487	554	584	579	582	602	578	594	593	587	590
26	566	554	563	585	580	583	605	408	525	594	588	591
27	567	553	561	586	575	580	610	599	604	592	581	586
28	568	555	560	584	578	582	609	601	606	589	582	586
29	563	557	560	589	575	583	611	600	604	586	577	581
30	569	561	565	583	574	578	624	611	615	585	579	581
31	566	561	554	---	---	---	624	607	614	586	581	583
MONTH				596	562	580	624	408	566	616	461	597

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	634	582	599	477	474	476	553	547	549	426	417	421
2	629	591	611	483	478	480	559	544	550	437	420	428
3	600	519	578	489	483	486	561	544	548	439	435	436
4	608	521	560	491	487	489	544	537	540	443	434	437
5	621	585	604	495	489	492	543	537	541	449	441	445
6	619	605	608	497	493	495	541	534	538	450	445	448
7	637	607	622	502	498	500	561	536	544	450	446	448
8	626	621	623	506	503	504	545	535	541	451	446	449
9	625	611	618	510	506	508	537	527	532	451	444	448
10	635	607	615	517	510	512	537	510	529	440	410	426
11	644	606	627	519	514	517	536	522	528	414	404	411
12	619	528	598	524	520	522	529	520	524	410	392	401
13	627	527	572	527	524	526	524	511	519	415	406	409
14	633	604	612	532	527	529	511	496	504	421	410	415
15	641	608	618	534	528	531	505	490	500	425	416	421
16	639	616	629	535	532	533	489	465	480	421	412	416
17	626	590	606	538	534	536	466	448	462	427	408	417
18	592	500	555	542	535	539	477	466	473	450	421	435
19	494	404	440	555	540	544	482	478	480	462	447	455
20	421	397	407	546	540	543	484	478	481	463	456	459
21	454	421	436	550	545	548	492	483	486	468	461	464
22	467	454	463	549	545	547	494	472	490	474	466	469
23	466	457	460	550	547	549	477	465	472	479	471	475
24	459	449	454	553	549	551	474	470	472	484	466	478
25	462	450	457	555	550	554	468	465	466	476	469	473
26	464	461	463	558	550	553	472	465	468	475	463	470
27	471	466	468	557	549	552	480	468	474	469	464	467
28	475	471	473	555	544	552	480	462	474	469	465	467
29	---	---	---	555	550	552	463	458	459	469	464	466
30	---	---	---	557	547	552	456	430	439	---	---	---
31	---	---	---	553	547	549	---	---	---	---	---	---
MONTH	644	397	549	558	474	526	561	430	502			

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1							---	---	---	494	482	486
2							---	---	---	496	456	469
3							---	---	---	461	454	457
4							---	---	---	466	457	460
5							---	---	---	468	461	465
6							---	---	---	477	465	471
7							---	---	---	482	477	480
8							---	---	---	486	477	481
9							---	---	---	485	480	483
10							---	---	---	495	482	486
11							---	---	---	500	488	492
12							480	473	476	509	495	500
13							486	478	481	506	500	504
14							494	477	483	509	501	504
15							486	476	483	517	508	512
16							487	481	484	520	506	514
17							486	481	484	509	501	506
18							489	486	487	516	503	509
19							497	486	490	513	506	510
20							502	494	498	511	509	510
21							502	499	501	514	506	510
22							509	501	506	518	508	513
23							510	502	507	518	510	514
24							508	504	507	521	514	518
25							530	511	516	528	515	520
26							527	502	513	527	407	511
27							533	471	491	502	415	470
28							508	493	501	490	441	466
29							504	463	487	454	443	449
30							491	479	486	455	426	442
31							495	466	488	---	---	---
MONTH										528	407	490

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	7.5	6.5	7.0	4.0	3.5	3.5	.5	.5	.5
2	---	---	---	7.0	6.5	6.5	4.0	3.0	3.5	.5	.0	.0
3	---	---	---	8.5	7.0	7.5	3.0	3.0	3.0	.0	.0	.0
4	---	---	---	8.5	7.5	8.0	3.0	2.5	3.0	.0	.0	.0
5	---	---	---	7.5	7.0	7.5	3.5	3.0	3.5	.0	.0	.0
6	---	---	---	8.5	7.0	7.5	4.0	3.0	3.5	.0	.0	.0
7	---	---	---	9.0	8.0	8.5	4.5	4.0	4.5	.0	.0	.0
8	---	---	---	9.0	8.5	8.5	5.5	4.5	5.5	.0	.0	.0
9	14.0	13.5	14.0	9.0	8.5	9.0	6.0	5.0	5.5	.0	.0	.0
10	14.0	13.0	13.5	9.0	8.0	8.5	6.0	5.0	5.5	.0	.0	.0
11	14.0	12.5	13.0	8.0	7.5	8.0	5.0	4.5	4.5	.0	.0	.0
12	12.5	12.0	12.5	8.0	7.5	7.5	4.0	4.0	4.0	.0	.0	.0
13	12.0	11.5	12.0	8.0	7.0	7.5	4.0	2.5	3.0	.0	.0	.0
14	12.0	11.5	11.5	8.0	7.0	7.5	2.5	2.5	2.5	.0	.0	.0
15	12.0	11.5	11.5	7.0	6.5	6.5	2.5	2.0	2.0	.5	.0	[illegible]
16	12.5	12.0	12.5	6.5	6.0	6.0	2.0	1.5	1.5	.5	.0	.0
17	13.0	12.5	13.0	6.0	6.0	6.0	1.5	1.0	1.0	.5	.0	.0
18	13.0	12.5	13.0	6.0	5.5	5.5	1.5	1.0	1.5	.5	.0	.0
19	13.0	12.0	12.5	5.5	5.0	5.0	1.0	.0	.5	1.0	.0	.5
20	12.5	12.0	12.0	5.0	4.5	5.0	.0	.0	.0	1.0	.5	.5
21	12.5	11.5	12.0	5.0	4.5	4.5	.0	.0	.0	1.0	.5	.5
22	12.0	11.0	11.5	4.5	4.0	4.0	.5	.0	.0	1.0	.5	.5
23	11.5	11.0	11.0	4.5	4.5	4.5	.5	.5	.5	1.0	.5	.5
24	11.0	10.5	11.0	4.5	4.5	4.5	.5	.0	.5	1.0	.5	.5
25	11.0	9.0	10.0	4.5	4.0	4.5	.0	.0	.0	1.5	1.0	1.0
26	9.0	8.0	8.5	4.5	3.5	4.0	.0	.0	.0	1.5	1.0	1.5
27	8.5	8.0	8.0	4.5	3.5	3.5	.0	.0	.0	1.0	1.0	1.0
28	8.0	7.5	7.5	4.0	3.5	3.5	.5	.0	.0	1.5	1.0	1.0
29	7.5	6.5	7.0	3.5	3.0	3.5	.5	.0	.5	1.0	.5	1.0
30	7.0	6.5	7.0	3.5	3.0	3.0	.5	.5	.5	1.0	.0	.5
31	7.5	6.5	7.0	---	---	---	.5	.0	.5	.5	.0	.5
MONTH				9.0	3.0	6.0	6.0	.0	2.0	1.5	.0	.5

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	.5	1.0	3.5	3.5	3.5	12.5	11.5	11.5	13.5	13.0	13.5
2	1.0	.0	.0	3.5	3.0	3.5	12.5	11.0	11.5	14.5	12.5	13.5
3	.0	.0	.0	3.5	3.0	3.0	12.5	12.0	12.5	15.0	13.0	14.0
4	.0	.0	.0	3.5	3.0	3.5	14.0	12.5	13.0	16.0	14.0	15.0
5	.0	.0	.0	3.5	3.0	3.5	13.0	11.0	11.5	16.0	15.5	16.0
6	.0	.0	.0	3.5	3.0	3.0	12.5	10.5	11.5	16.5	15.5	16.0
7	.5	.0	.0	3.0	2.5	2.5	12.0	11.0	11.5	16.5	15.0	15.5
8	.5	.0	.0	2.5	2.0	2.5	12.0	11.5	12.0	16.0	15.0	15.5
9	.5	.0	.0	3.0	2.0	2.5	13.5	11.5	12.5	16.5	15.0	16.0
10	.5	.0	.0	3.5	2.5	3.0	13.5	12.5	12.5	16.0	14.5	15.0
11	.5	.0	.0	3.5	3.0	3.5	14.0	13.0	13.5	14.5	13.0	14.0
12	.0	.0	.0	5.0	3.0	4.0	14.0	13.5	13.5	13.0	11.5	12.5
13	.0	.0	.0	4.5	4.0	4.5	14.0	13.0	13.5	12.5	11.5	12.0
14	.5	.0	.0	5.5	4.0	4.5	14.0	13.5	14.0	12.5	12.0	12.0
15	1.5	.5	.5	6.0	4.5	5.5	14.0	12.5	13.0	13.0	11.5	12.0
16	1.5	1.0	1.5	6.0	4.5	5.5	13.5	12.0	13.0	13.5	11.5	12.5
17	2.0	1.0	1.5	6.0	5.0	5.5	14.5	12.5	13.5	13.5	12.0	13.0
18	1.5	1.0	1.0	5.5	5.0	5.0	15.0	13.0	14.0	13.5	13.0	13.0
19	1.5	1.0	1.0	5.0	4.5	4.5	15.0	14.0	14.5	14.5	13.0	13.5
20	2.0	1.5	1.5	4.5	4.0	4.0	15.0	14.0	14.5	15.5	13.0	14.0
21	3.0	2.0	2.5	5.0	3.5	4.5	14.5	13.0	14.0	16.5	14.0	15.0
22	3.0	2.5	3.0	5.5	4.0	4.5	14.0	13.0	13.0	17.5	15.5	16.5
23	3.5	3.0	3.0	6.0	4.5	5.5	13.0	12.5	13.0	18.5	16.5	17.5
24	3.5	3.0	3.5	7.0	5.5	6.0	12.5	11.5	12.0	19.0	17.5	18.5
25	4.0	3.0	3.5	7.5	6.5	7.0	12.0	11.0	11.5	20.0	18.5	19.0
26	4.0	3.0	3.5	8.0	7.5	7.5	12.0	10.5	11.5	19.5	19.0	19.5
27	4.0	3.5	3.5	9.0	7.5	8.0	13.5	11.0	12.0	20.0	19.0	19.5
28	3.5	3.5	3.5	10.0	8.0	9.0	13.5	13.0	13.5	20.5	18.5	19.5
29	---	---	---	10.0	9.5	9.5	14.0	13.5	13.5	20.0	19.0	19.5
30	---	---	---	10.5	10.0	10.0	14.0	13.5	14.0	---	---	---
31	---	---	---	12.5	10.0	11.0	---	---	---	---	---	---
MONTH	4.0	.0	1.0	12.5	2.0	5.0	15.0	10.5	13.0	20.5	11.5	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1							---	---	---	23.0	22.0	22.5
2							---	---	---	23.0	22.0	22.0
3							---	---	---	22.0	21.5	22.0
4							---	---	---	22.0	21.0	21.5
5							---	---	---	21.5	20.5	21.0
6							---	---	---	21.0	20.5	21.0
7							---	---	---	21.0	20.5	21.0
8							---	---	---	21.0	20.0	20.5
9							---	---	---	20.5	19.5	20.0
10							---	---	---	21.0	19.5	20.0
11							---	---	---	21.0	19.5	20.5
12							23.0	22.5	23.0	21.5	20.0	20.5
13							23.5	22.0	23.0	22.0	20.5	21.0
14							23.0	22.0	22.5	22.5	21.5	22.0
15							22.5	22.0	22.5	22.0	21.0	21.0
16							22.5	21.5	21.5	21.0	20.0	20.5
17							22.0	20.5	21.0	20.0	18.0	19.0
18							21.5	20.5	21.0	18.0	17.0	17.5
19							21.5	20.0	21.0	17.5	16.5	17.0
20							21.5	20.5	21.0	17.0	16.0	16.5
21							22.0	20.5	21.0	16.5	16.0	16.5
22							22.0	20.5	21.5	16.5	16.0	16.0
23							22.5	20.5	21.5	16.0	15.0	15.5
24							23.0	21.0	22.0	16.0	15.5	15.5
25							25.0	21.5	22.5	16.0	15.5	15.5
26							23.0	22.0	22.5	17.0	15.5	16.0
27							22.5	22.0	22.0	16.5	16.0	16.0
28							22.5	21.5	22.0	16.5	15.5	16.0
29							22.0	21.5	22.0	16.0	15.0	15.5
30							23.0	21.5	22.0	16.0	15.0	15.0
31							23.0	22.0	22.5	---	---	---
MONTH										23.0	15.0	19.0

04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE¼ sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft (9 m) upstream from bridge on Indian Lake Road, 0.3 mi (0.5 km) west of Sumnerville.

DRAINAGE AREA.--255 mi^2 (660 km^2).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft (211.111 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 282 ft^3/s (7.986 m^3/s), 15.02 in/yr (382 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft^3/s (36.2 m^3/s) June 26, 1968, gage height, 8.78 ft (2.676 m); minimum, 86 ft^3/s (2.44 m^3/s) Sept. 10, 1964; minimum gage height, 2.57 ft (0.783 m) Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,020 ft^3/s (28.9 m^3/s) Apr. 29, gage height, 7.74 ft (2.359 m); minimum, 160 ft^3/s (4.79 m^3/s) Aug. 25, 26, gage height, 3.36 ft (1.024 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	230	273	314	290	288	440	316	602	460	284	289	254
2	228	266	416	284	291	422	305	514	403	279	267	262
3	250	262	421	278	250	407	297	458	374	267	278	257
4	262	264	370	251	282	402	302	419	343	268	271	249
5	252	263	341	279	277	401	292	394	322	310	243	238
6	244	258	341	274	280	384	284	380	320	306	235	232
7	238	256	342	271	275	369	280	357	305	267	229	225
8	234	254	438	269	268	358	276	344	294	253	233	228
9	228	252	516	254	264	352	313	335	329	244	231	220
10	223	246	457	271	272	351	313	529	363	236	218	212
11	219	242	396	263	321	346	333	949	334	225	212	206
12	227	244	364	266	275	339	372	855	309	222	205	202
13	232	241	350	265	316	333	400	662	471	230	201	198
14	233	247	329	260	316	323	533	639	733	226	196	200
15	241	245	315	262	310	320	495	721	672	213	220	195
16	266	241	302	261	354	312	423	606	616	214	219	195
17	282	239	288	260	513	306	395	521	536	206	209	201
18	314	238	284	256	738	301	373	471	458	200	200	211
19	301	235	279	261	893	299	366	437	406	197	196	203
20	288	235	273	260	891	302	341	407	378	218	188	198
21	276	234	277	258	774	304	319	386	432	234	182	195
22	265	233	270	259	677	315	316	370	482	217	178	198
23	258	239	272	259	657	305	473	356	429	204	176	198
24	260	261	272	257	623	297	471	350	385	196	173	196
25	317	260	262	258	564	293	420	441	380	188	171	198
26	316	251	265	286	510	303	383	409	353	229	170	214
27	307	255	259	308	474	316	361	385	330	241	240	374
28	306	276	263	307	462	305	473	368	314	392	282	361
29	297	294	277	299	---	299	1000	357	302	449	278	323
30	287	293	292	283	---	317	823	580	291	379	272	433
31	280	---	292	265	---	325	---	591	---	318	263	---
TOTAL	8150	7507	10137	8374	12415	10446	12028	15193	12124	7912	6925	7076
MEAN	263	253	327	270	443	337	401	490	404	255	223	236
MAX	317	294	516	308	893	440	1000	949	733	449	289	433
MIN	219	233	259	251	250	293	276	335	291	188	170	195
CFSM	1.03	.99	1.28	1.06	1.74	1.32	1.57	1.92	1.58	1.00	.88	.93
IN.	1.19	1.11	1.48	1.22	1.81	1.52	1.75	2.22	1.77	1.15	1.01	1.03

CAL YR 1980 TOTAL 115680 MEAN 316 MAX 795 MIN 184 CFSM 1.24 IN 16.85
WTR YR 1981 TOTAL 118386 MEAN 324 MAX 1000 MIN 170 CFSM 1.27 IN 17.27

04102320 PAW PAW RIVER NEAR PAW PAW, MI

LOCATION.--Lat 42°16'01", long 85°56'15", in SW¼ NW¼ sec. 27, T.2 S., R.14 W., Van Buren County, Hydrologic Unit 04050001, on downstream side of 40th Street bridge, 3.1 mi (5.0 km) northwest of Paw Paw, and 0.7 mi (1.1 km) downstream from confluence of North Branch and South Branch.

DRAINAGE AREA.--195 mi² (505 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1980 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 685 ft (209 m), from topographic map (nearest 10 ft).

REMARKS.--Water discharge records good. Occasional regulation caused by dam on South Branch Paw Paw River. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,230 ft³/s (34.8 m³/s) May 11, 1981, gage height, 5.73 ft (1.747 m); minimum, 108 ft³/s (3.06 m³/s) Sept. 29, 1980; minimum gage height, 0.91 ft (0.277 m) Aug. 21, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,230 ft³/s (34.8 m³/s) May 11, gage height, 5.73 ft (1.747 m); minimum, 110 ft³/s (3.12 m³/s) Aug. 21, gage height, 0.91 ft (0.277 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1										128	158	229
2										132	186	269
3										130	356	324
4										124	459	302
5										181	380	263
6										283	303	224
7										281	249	164
8										229	225	145
9										175	206	192
10										178	194	186
11										176	177	165
12										164	209	155
13										189	206	172
14										197	251	177
15										184	395	174
16										182	393	167
17										249	351	223
18										218	363	306
19										191	358	323
20										185	358	285
21										182	700	267
22										248	630	229
23										159	379	217
24										140	326	210
25										146	288	203
26										132	257	202
27										155	196	196
28										196	194	166
29										233	185	136
30										197	156	189
31										173	176	---
TOTAL	---	---	---	---	---	---	---	---	---	5737	9264	6460
MEAN	---	---	---	---	---	---	---	---	---	185	299	215
MAX	---	---	---	---	---	---	---	---	---	283	700	324
MIN	---	---	---	---	---	---	---	---	---	124	155	136
CFSM	---	---	---	---	---	---	---	---	---	.95	1.53	1.10
IN.	---	---	---	---	---	---	---	---	---	1.09	1.77	1.23

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	169	219	229	234	213	320	258	400	230	165	138	200
2	158	202	261	228	211	311	235	353	202	165	138	210
3	165	194	330	198	184	305	223	306	187	163	151	190
4	171	196	339	167	195	289	220	266	193	163	153	170
5	168	199	306	178	211	279	216	255	203	167	150	160
6	162	198	256	211	213	273	210	239	187	164	146	160
7	159	195	299	225	204	265	207	221	171	160	141	150
8	157	191	444	218	197	248	204	214	170	152	149	150
9	153	184	596	210	187	215	223	209	189	144	149	150
10	151	166	514	201	180	250	241	253	213	142	145	148
11	150	181	382	194	208	255	263	805	201	139	144	154
12	159	181	330	198	226	251	301	1070	177	138	136	149
13	190	171	300	195	247	246	307	663	227	142	129	144
14	167	168	280	192	231	239	330	442	400	142	128	131
15	159	164	263	192	227	231	362	381	595	137	136	139
16	170	177	232	187	256	225	337	363	505	134	140	137
17	197	179	201	189	345	220	286	319	376	129	139	156
18	250	166	210	176	659	209	259	283	295	132	134	160
19	233	163	198	178	1090	212	244	252	264	133	127	147
20	232	161	162	179	1060	222	249	240	238	140	118	146
21	227	162	185	182	661	217	235	238	205	141	113	182
22	213	162	206	193	620	225	218	232	218	139	116	231
23	193	163	204	199	551	225	364	223	239	134	116	238
24	188	173	201	170	493	221	722	215	241	128	116	213
25	210	193	181	195	427	217	557	234	236	125	116	171
26	253	195	165	236	388	225	359	253	220	131	116	178
27	264	183	178	237	349	262	314	280	205	144	154	237
28	254	183	197	230	334	267	301	271	190	161	185	255
29	232	196	203	243	---	250	320	244	168	193	190	246
30	216	210	227	206	---	223	415	231	164	168	178	251
31	210	---	234	195	---	260	---	245	---	140	190	---
TOTAL	5980	5475	8313	6236	10367	7657	8980	10200	7309	4555	4381	5353
MEAN	193	183	268	201	370	247	299	329	244	147	141	178
MAX	264	219	596	243	1090	320	722	1070	595	193	190	255
MIN	150	161	162	167	180	209	204	209	164	125	113	131
CFSM	.99	.94	1.37	1.03	1.90	1.27	1.53	1.69	1.25	.75	.72	.91
IN.	1.14	1.04	1.59	1.19	1.98	1.46	1.71	1.95	1.39	.87	.84	1.02

WTR YR 1981 TOTAL 84806 MEAN 232 MAX 1090 MIN 113 CFSM 1.19 IN 16.18

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 1980 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1980 to current year.
SUSPENDED-SEDIMENT DISCHARGE: July 1980 to current year.

REMARKS.--Sediment samples were collected on an approximate daily basis by a local observer. Water-quality samples were collected about once a month. Daily water temperature record based on once-daily measurement at 1700 hours.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily, 25.0°C August 19, 1981; minimum daily, 0.0°C on several days during winter period.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 204 mg/L May 5, 1981; minimum daily mean, 1 mg/L November 5, 25, 1980.
SEDIMENT LOADS: Maximum daily, 140 tons (127 tonnes) May 5, 1981; minimum daily, 0.52 tons (0.47 tonnes) November 25, 1980.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
APR											
24...	1230	236	440	--	11.5	--	--	--	--	--	--
MAY											
04...	1810	166	442	--	14.5	--	--	--	--	--	--
JUN											
03...	1615	320	365	--	14.0	--	--	.83	.010	.84	.130
04...	1045	405	343	--	17.0	--	--	--	--	--	--
05...	1050	345	422	--	15.5	--	--	--	--	--	--
10...	0810	764	343	--	14.5	--	--	.72	.020	.74	.000
JUL											
09...	1300	170	437	7.9	20.5	6.8	75	.69	.050	.74	.010
AUG											
05...	0745	368	400	7.7	20.0	6.2	69	.50	.030	.53	.000
SEP											
03...	1830	318	403	7.4	20.0	7.2	77	.17	.020	.19	.050

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHATE, TOTAL (MG/L AS PO4)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
APR											
24...	--	--	--	--	--	--	--	--	--	4	2.5
MAY											
04...	--	--	--	--	--	--	--	--	--	8	3.6
JUN											
03...	.16	.80	.93	1.8	7.8	.130	.12	.40	.040	48	41
04...	--	--	--	--	--	--	--	--	--	11	12
05...	--	--	--	--	--	--	--	--	--	9	8.4
10...	.00	.74	.74	1.5	6.6	.050	.09	.15	.030	11	23
JUL											
09...	.01	.40	.41	1.2	5.1	.040	.06	.12	.020	19	9.0
AUG											
05...	.00	.24	.24	.77	3.4	.050	.03	.15	.010	12	10
SEP											
03...	.06	.41	.46	.65	2.9	.280	.03	.86	.010	--	--

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04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)
OCT												
15...	1345	158	450	--	10.0	--	--	--	.59	--	--	.010
DEC												
03...	1330	328	444	7.3	1.0	11.8	81	--	.66	--	--	.010
JAN												
08...	1500	210	492	7.8	.3	12.2	83	1.2	.90	--	--	.010
FEB												
04...	0915	196	455	7.3	.0	12.3	83	--	.94	--	--	.010
19...	1215	1050	259	7.7	1.0	12.2	85	--	.40	--	--	.010
21...	1300	625	305	7.7	3.5	12.0	89	1.8	1.2	--	--	.020
23...	1500	568	367	7.7	4.5	11.5	90	1.5	1.2	--	--	.010
MAR												
03...	1440	246	400	7.8	4.5	11.8	89	1.2	.96	.95	4.2	.010
APR												
07...	1330	216	423	8.0	16.5	11.3	82	--	.64	--	--	<.010
MAY												
12...	1330	951	285	7.6	10.5	10.5	92	--	.54	--	--	.010
14...	1500	424	--	--	--	--	--	--	--	--	--	--
16...	1440	368	--	--	--	--	--	--	--	--	--	--
JUN												
10...	1045	204	435	7.9	17.5	7.3	76	--	.63	--	--	<.010
JUL												
07...	1630	160	430	8.1	23.5	7.4	90	--	.39	--	--	<.010
AUG												
05...	1015	153	420	8.1	20.5	7.3	79	.74	--	.49	2.2	<.010
SEP												
16...	0945	137	420	8.0	16.0	7.4	74	--	.59	--	--	.020

DATE	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)
OCT												
15...	--	--	.60	--	.040	--	.05	--	.16	--	.20	--
DEC												
03...	--	--	.67	--	.040	--	.05	--	.25	--	.29	--
JAN												
08...	.010	.03	.91	.89	.110	.120	.13	.15	.16	.06	.27	--
FEB												
04...	--	--	.95	--	.080	--	--	--	.34	--	.42	--
19...	--	--	.41	--	.060	--	--	--	.40	--	.46	--
21...	.010	.03	1.2	1.2	.060	.060	--	.08	.53	.52	.59	--
23...	.010	.03	1.2	1.1	.070	.060	--	.08	.41	.47	.48	--
MAR												
03...	.010	.03	.97	.96	.110	.070	--	.09	.19	.21	.30	.02
APR												
07...	--	--	.65	--	.040	--	--	--	.67	--	.71	--
MAY												
12...	--	--	.55	--	.020	--	--	--	.72	--	.74	--
14...	--	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
10...	--	--	.63	--	.080	--	--	--	.44	--	.52	--
JUL												
07...	--	--	.39	--	.020	--	--	--	.46	--	.48	--
AUG												
05...	.010	.03	.46	.50	.020	.030	--	.04	.42	.21	.44	.20
SEP												
16...	--	--	.61	--	.050	--	--	--	.36	--	.41	--

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHATE, TOTAL (MG/L AS PO4)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
OCT												
15...	--	.80	3.5	.020	.00	.05	--	.000	--	--	--	--
DEC												
03...	--	.96	4.3	.050	.09	.15	--	.030	--	--	7	6.2
JAN												
08...	.18	1.2	5.2	.040	.06	.12	.010	.020	.000	.00	5	2.9
FEB												
04...	--	1.4	6.1	.060	--	--	--	.020	--	--	7	3.7
19...	--	.87	3.9	.070	--	.21	--	.010	--	--	22	63
21...	.58	1.8	7.9	.040	--	.12	.030	.020	.010	.03	5	8.4
23...	.53	1.7	7.4	.040	--	.12	.020	.010	<.010	--	5	7.5
MAR												
03...	.28	1.3	5.6	.020	--	.06	<.010	<.010	<.010	--	6	4.6
APR												
07...	--	1.4	6.0	.040	--	.12	--	.010	--	--	4	2.3
MAY												
12...	--	1.3	5.7	.050	--	.15	--	.030	--	--	11	28
14...	--	--	--	--	--	--	--	--	--	--	7	8.0
16...	--	--	--	--	--	--	--	--	--	--	6	6.0
JUN												
10...	--	1.2	5.1	.030	--	.09	--	.010	--	--	23	13
JUL												
07...	--	.87	3.9	.040	--	.12	--	<.010	--	--	18	7.8
AUG												
05...	.24	.90	4.0	.050	--	.15	<.010	<.010	<.010	--	12	5.0
SEP												
16...	--	1.0	4.5	.040	--	.12	--	<.010	--	--	13	4.8

DATE	TIME	TURBIDITY (NTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY												
12...	1900	4.0	43	140	9.0	36	12	4.7	.2	7	1.5	130

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY												
12...	25	8.7	.1	6.3	1.1	201	173	.27	516	0	1	20

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY												
12...	1	9	600	22	<4	20	<.1	3	0	70	60	30

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)
MAY											
12...	1900	<.1	<.10	<.01	<.10	<.01	<.01	<.01	<.01	<.01	<.01
22...	1418	--	--	--	--	--	--	--	--	--	--

DATE	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)
MAY											
12...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01
22...	--	--	--	--	--	--	--	--	.0	--	--

DATE	METHYL TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)
MAY										
12...	<.01	<.01	<.01	<.01	.0	.00	<.01	<.01	<1.0	<.01
22...	--	--	--	--	.0	.00	--	--	--	--

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1												---
2												---
3												---
4												22.0
5												---
6												21.0
7												19.0
8												21.0
9												20.0
10												19.0
11												18.0
12												17.0
13												19.0
14												19.0
15												18.0
16												17.0
17												16.0
18												16.0
19												19.0
20												20.0
21												20.0
22												18.0
23												16.0
24												16.0
25												16.0
26												15.0
27												14.0
28												15.0
29												11.0
30												16.0
31												---

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17.0	7.0	4.0	.0	3.0	4.0	11.0	15.0	19.0	24.0	---	22.0
2	15.0	7.0	2.0	1.0	2.0	4.0	---	15.0	20.0	24.0	---	21.0
3	14.0	8.0	1.0	.0	2.0	4.0	---	16.0	20.0	24.0	---	---
4	12.0	8.0	2.0	.0	1.0	4.0	---	17.0	22.0	21.0	---	---
5	12.0	8.0	3.0	1.0	1.0	4.0	---	16.0	21.0	22.0	---	---
6	12.0	7.0	5.0	2.0	1.0	4.0	12.0	16.0	22.0	22.0	---	---
7	13.0	8.0	7.0	2.0	1.0	4.0	12.0	16.0	22.0	22.0	---	---
8	13.0	8.0	---	---	.0	4.0	---	16.0	21.0	21.0	---	---
9	13.0	9.0	5.0	3.0	1.0	4.0	13.0	16.0	19.0	20.0	---	---
10	12.0	8.0	3.0	---	1.0	5.0	---	15.0	20.0	20.0	---	20.0
11	11.0	7.0	2.0	1.0	1.0	5.0	14.0	11.0	20.0	20.0	---	20.0
12	11.0	5.0	4.0	1.0	2.0	6.0	14.0	15.0	21.0	20.0	---	20.0
13	11.0	7.0	2.0	2.0	2.0	6.0	13.0	14.0	20.0	20.0	---	20.0
14	11.0	7.0	3.0	3.0	2.0	6.0	13.0	14.0	22.0	19.0	---	20.0
15	11.0	6.0	2.0	2.0	2.0	6.0	14.0	13.0	24.0	17.0	---	17.0
16	13.0	5.0	4.0	2.0	3.0	---	14.0	---	23.0	20.0	---	14.0
17	14.0	4.0	3.0	2.0	3.0	---	14.0	---	22.0	---	20.0	15.0
18	12.0	4.0	2.0	2.0	4.0	6.0	---	---	---	22.0	20.0	16.0
19	11.0	4.0	1.0	2.0	4.0	6.0	15.0	---	---	20.0	25.0	16.0
20	11.0	4.0	.0	2.0	4.0	6.0	---	---	---	20.0	22.0	15.0
21	11.0	4.0	---	2.0	5.0	7.0	---	---	21.0	---	20.0	17.0
22	10.0	4.0	2.0	3.0	5.0	8.0	---	---	20.0	---	21.0	17.0
23	9.0	4.0	3.0	3.0	5.0	8.0	---	---	20.0	---	22.0	14.0
24	9.0	4.0	2.0	4.0	5.0	---	---	---	21.0	---	22.0	15.0
25	8.0	4.0	2.0	4.0	5.0	9.0	14.0	20.0	21.0	---	22.0	15.0
26	6.0	4.0	1.0	4.0	4.0	10.0	---	20.0	21.0	---	22.0	16.0
27	6.0	4.0	2.0	3.0	4.0	10.0	14.0	20.0	21.0	---	20.0	15.0
28	6.0	---	2.0	3.0	4.0	10.0	14.0	20.0	21.0	---	20.0	14.0
29	6.0	4.0	1.0	3.0	---	10.0	14.0	19.0	---	---	20.0	13.0
30	6.0	4.0	1.0	3.0	---	---	14.0	19.0	24.0	---	22.0	---
31	7.0	---	2.0	3.0	---	---	---	---	---	---	22.0	---

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	---	---	---	---	---	---	13	5.5	10	6.2
2	---	---	---	---	---	---	---	---	30	15	11	8.0
3	---	---	---	---	48	41	---	---	18	17	9	7.9
4	---	---	---	---	11	12	---	---	8	9.9	8	6.5
5	---	---	---	---	9	8.4	---	---	8	8.2	5	3.6
6	---	---	---	---	---	---	---	---	10	8.2	6	3.6
7	---	---	---	---	---	---	---	---	13	8.7	7	3.1
8	---	---	8	3.6	---	---	---	---	14	8.5	12	4.7
9	---	---	---	---	---	---	19	9.0	13	7.2	10	5.2
10	---	---	---	---	11	23	---	---	14	7.3	6	3.0
11	---	---	---	---	---	---	---	---	15	7.2	7	3.1
12	---	---	---	---	---	---	---	---	13	7.3	8	3.3
13	---	---	---	---	---	---	---	---	12	6.7	9	4.2
14	---	---	---	---	---	---	---	---	40	27	8	3.8
15	---	---	---	---	---	---	---	---	10	11	9	4.2
16	---	---	---	---	---	---	---	---	8	8.5	16	7.2
17	---	---	---	---	---	---	---	---	19	18	31	19
18	---	---	---	---	---	---	---	---	7	6.9	10	8.3
19	---	---	---	---	---	---	---	---	8	7.7	7	6.1
20	---	---	---	---	---	---	---	---	36	35	4	3.1
21	---	---	---	---	---	---	20	9.8	17	32	6	4.3
22	---	---	---	---	---	---	15	10	9	15	6	3.7
23	---	---	---	---	---	---	17	7.3	4	4.1	5	2.9
24	4	2.5	---	---	---	---	14	5.3	7	6.2	6	3.4
25	---	---	---	---	---	---	18	7.1	7	5.4	5	2.7
26	---	---	---	---	---	---	13	4.6	10	6.9	5	2.7
27	---	---	---	---	---	---	19	8.0	11	5.8	5	2.6
28	---	---	---	---	---	---	21	11	9	4.7	6	2.7
29	---	---	---	---	---	---	12	7.5	8	4.0	3	1.1
30	---	---	---	---	---	---	14	7.4	9	3.8	4	2.0
31	---	---	---	---	---	---	12	5.6	11	5.2	---	---
TOTAL									---	323.9	---	142.2

04102320 PAW PAW RIVER NEAR PAW PAW, MI--CONTINUED

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	2	.91	3	1.8	4	2.5	4	2.5	5	2.9	6	5.2
2	4	1.7	2	1.1	9	6.3	5	3.1	6	3.4	3	2.5
3	2	.89	2	1.0	7	6.2	5	2.7	5	2.5	7	5.8
4	3	1.4	3	1.6	3	2.7	5	2.3	3	1.6	6	4.7
5	4	1.8	1	.54	4	3.3	11	5.3	3	1.7	3	2.3
6	2	.87	3	1.6	3	2.1	8	4.6	4	2.3	5	3.7
7	4	1.7	2	1.1	24	19	8	4.9	4	2.2	5	3.6
8	3	1.3	4	2.1	13	16	8	4.7	6	3.2	6	4.0
9	4	1.7	2	.99	10	16	12	6.8	4	2.0	5	2.9
10	3	1.2	2	.90	7	9.7	8	4.3	7	3.4	9	6.1
11	3	1.2	3	1.5	7	7.2	12	6.3	9	5.1	9	6.2
12	4	1.7	2	.98	3	2.7	8	4.3	5	3.1	4	2.7
13	3	1.5	3	1.4	5	4.1	7	3.7	5	3.3	7	4.6
14	3	1.4	3	1.4	6	4.5	10	5.2	12	7.5	6	3.9
15	3	1.3	5	2.2	5	3.6	38	20	12	7.4	6	3.7
16	3	1.4	4	1.9	5	3.1	2	1.0	10	6.9	12	7.3
17	3	1.6	5	2.4	7	3.8	4	2.0	12	11	5	3.0
18	4	2.7	11	4.9	8	4.5	5	2.4	25	44	6	3.4
19	2	1.3	3	1.3	6	3.2	4	1.9	29	85	6	3.4
20	2	1.3	3	1.3	15	6.6	7	3.4	5	14	4	2.4
21	3	1.8	8	3.5	5	2.5	6	2.9	4	7.1	6	3.5
22	3	1.7	9	3.9	3	1.7	5	2.6	3	5.0	5	3.0
23	3	1.6	6	2.6	5	2.8	7	3.8	9	13	5	3.0
24	4	2.0	5	2.3	20	11	6	2.8	4	5.3	8	4.8
25	3	1.7	1	.52	7	3.4	5	2.6	4	4.6	8	4.7
26	5	3.4	5	2.6	4	1.8	3	1.9	4	4.2	8	4.9
27	3	2.1	4	2.0	4	1.9	7	4.5	3	2.8	8	5.7
28	3	2.1	4	2.0	8	4.3	4	2.5	3	2.7	7	5.0
29	3	1.9	5	2.6	4	2.2	3	2.0	---	---	8	5.4
30	2	1.2	4	2.3	5	3.1	7	3.9	---	---	7	4.2
31	4	2.3	---	---	8	5.1	4	2.1	---	---	---	---
TOTAL	---	50.67	---	56.33	---	166.9	---	123.0	---	257.2	---	125.6

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7	4.9	8	8.6	18	11	19	8.5	14	5.2	21	11
2	8	5.1	14	13	19	10	17	7.6	11	4.1	15	8.5
3	7	4.2	10	8.3	21	11	19	8.4	17	6.9	7	3.6
4	6	3.6	10	7.2	26	14	19	8.4	16	6.6	22	10
5	5	2.9	204	140	24	13	20	9.0	16	6.5	12	5.2
6	4	2.3	10	6.5	24	12	18	8.0	12	4.7	---	---
7	8	4.5	9	5.4	26	12	26	11	29	11	---	---
8	11	6.1	19	11	21	9.6	18	7.4	21	8.4	---	---
9	6	3.6	47	27	26	13	21	8.2	7	2.8	---	---
10	8	5.2	19	13	17	9.8	17	6.5	8	3.1	55	22
11	24	17	34	74	20	11	18	6.8	8	3.1	6	2.5
12	22	18	9	26	22	11	18	6.7	12	4.4	4	1.6
13	23	19	5	9.0	10	6.1	17	6.5	11	3.8	5	1.9
14	25	22	4	4.8	9	9.7	20	7.7	7	2.4	5	1.8
15	9	8.8	7	7.2	10	16	18	6.7	8	2.9	5	1.9
16	6	5.5	9	8.8	15	20	15	5.4	12	4.5	5	1.8
17	4	3.1	10	8.6	10	10	16	5.6	14	5.3	3	1.3
18	8	5.6	38	29	12	9.6	13	4.6	21	7.6	13	5.6
19	6	4.0	30	20	14	10	19	6.8	11	3.8	3	1.2
20	4	2.7	27	17	16	10	18	6.8	7	2.2	30	12
21	8	5.1	22	14	20	11	14	5.3	15	4.6	15	7.4
22	8	4.7	17	11	22	13	19	7.1	9	2.8	7	4.4
23	6	5.9	14	8.4	25	16	18	6.5	7	2.2	10	6.4
24	4	7.8	13	7.5	23	15	16	5.5	10	3.1	15	8.6
25	8	12	12	7.6	26	17	21	7.1	9	2.8	16	7.4
26	10	9.7	14	9.6	21	12	38	13	7	2.2	15	7.2
27	12	10	16	12	22	12	21	8.2	20	8.3	10	6.4
28	12	9.8	15	11	23	12	31	13	19	9.5	8	5.5
29	7	6.0	27	18	15	6.8	17	8.9	16	8.2	8	5.3
30	7	7.8	19	12	18	8.0	15	6.8	10	4.8	8	5.4
31	---	---	---	---	---	---	16	6.0	26	13	---	---
TOTAL	---	226.9	---	555.5	---	351.6	---	234.0	---	160.8		

04102420 PAW PAW RIVER NEAR HARTFORD, MI

LOCATION.--Lat 42°13'01", long 86°12'02", in SE¼ SW¼ sec.8, T.3 S., R.16 W., Van Buren County, Hydrologic Unit 04050001, on upstream rail of 6750th Street bridge, 1.3 mi (2.1 km) northwest of Hartford, and 0.3 mi (0.5 km) upstream from Pine Creek.

DRAINAGE AREA.--311 mi^2 (805 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1980 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 625 ft (190 m), from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,760 ft^3/s (49.8 m^3/s) Feb. 21, 1981, gage height, 9.76 ft (2.975 m); minimum, 226 ft^3/s (6.40 m^3/s) Aug. 22, 1981, gage height, 3.65 ft (1.113 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,760 ft^3/s (49.8 m^3/s) Feb. 21, gage height, 9.76 ft (2.975 m); minimum, 226 ft^3/s (6.40 m^3/s) Aug. 22, gage height, 3.65 ft (1.113 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1										272	290	336
2										266	306	368
3										263	460	372
4										260	467	370
5										458	477	382
6										536	518	386
7										493	546	368
8										447	494	329
9										419	409	275
10										380	357	287
11										338	337	289
12										324	329	280
13										310	319	277
14										311	492	283
15										310	510	283
16										344	468	281
17										370	530	387
18										359	623	415
19										359	628	403
20										340	631	405
21										339	649	424
22										322	632	418
23										340	662	399
24										324	755	371
25										273	763	344
26										263	619	335
27										264	482	322
28										296	406	311
29										301	349	299
30										311	312	262
31										313	298	---
TOTAL	---	---	---	---	---	---	---	---	---	10505	15118	10261
MEAN	---	---	---	---	---	---	---	---	---	339	488	342
MAX	---	---	---	---	---	---	---	---	---	536	763	424
MIN	---	---	---	---	---	---	---	---	---	260	290	262
CFSM	---	---	---	---	---	---	---	---	---	1.09	1.57	1.10
IN.	---	---	---	---	---	---	---	---	---	1.26	1.81	1.23

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	276	343	320	370	340	685	422	632	381	279	256	310
2	282	330	372	370	330	624	422	645	372	276	252	341
3	287	325	397	360	330	581	413	654	367	274	258	358
4	293	323	398	350	330	549	399	611	333	273	269	340
5	291	318	413	330	330	534	385	535	319	271	273	298
6	285	312	454	300	330	510	376	470	324	271	273	283
7	279	308	528	320	330	486	368	425	312	267	268	275
8	274	304	621	350	330	466	363	391	293	262	263	270
9	270	301	682	370	340	455	377	369	298	256	268	257
10	266	294	710	350	340	431	389	437	319	247	268	252
11	264	283	795	340	340	418	411	873	334	243	262	251
12	267	273	827	330	340	422	446	897	328	243	258	244
13	279	277	756	325	350	420	469	1110	375	246	253	239
14	289	278	630	320	370	412	528	1330	426	247	246	237
15	292	275	516	320	400	404	560	1100	427	245	248	231
16	288	268	450	320	450	393	564	939	712	242	253	232
17	308	264	420	320	598	384	566	801	805	240	253	239
18	341	270	370	320	878	375	546	674	829	234	251	256
19	345	267	343	320	1000	366	493	583	730	235	245	258
20	352	260	330	320	1290	363	453	502	558	236	241	256
21	350	257	320	329	1720	371	421	449	451	241	232	250
22	342	254	315	304	1490	375	412	416	427	241	227	283
23	334	256	310	310	1170	376	687	395	392	238	229	306
24	330	266	306	315	1060	377	734	383	381	235	229	321
25	345	273	298	306	1000	374	752	405	379	229	229	324
26	357	274	332	333	934	380	875	422	362	229	230	308
27	357	280	310	374	850	398	917	418	336	235	255	328
28	363	291	280	390	768	407	800	416	316	252	281	338
29	368	301	300	383	---	417	716	418	301	273	309	343
30	367	307	325	375	---	432	667	431	286	294	318	549
31	358	---	350	360	---	430	---	404	---	282	304	---
TOTAL	9699	8632	13778	10484	18338	13615	15931	18535	12473	7836	8001	8777
MEAN	313	288	444	338	655	439	531	598	416	253	258	293
MAX	368	343	827	390	1720	685	917	1330	829	294	318	549
MIN	264	254	280	300	330	363	363	369	286	229	227	231
CFSM	1.01	.93	1.43	1.09	2.11	1.41	1.71	1.92	1.34	.81	.83	.94
IN.	1.16	1.03	1.65	1.25	2.19	1.63	1.91	2.22	1.49	.94	.96	1.05

WTR YR 1981 TOTAL 146099 MEAN 408 MAX 1720 MIN 227 CFSM 1.29 IN 17.48

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 1980 to current year.

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: July 1980 to current year.

REMARKS.--Sediment samples were collected on an approximate daily basis by a local observer. Water-quality samples were collected about once a month.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 188 mg/L May 12, 1981; minimum daily mean, 1 mg/L on several days during November 1980.
SEDIMENT LOADS: Maximum daily, 659 tons (598 tonnes) February 21, 1981; minimum daily, 0.69 tons (0.63 tonnes) November 21, 22, 1980.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
APR											
23...	1500	473	420	--	16.0	--	--	--	--	--	--
MAY											
09...	1505	279	448	--	14.0	--	--	--	--	--	--
JUN											
04...	1520	478	374	--	18.0	--	--	.78	.020	.80	.060
05...	0850	489	362	--	15.5	--	--	--	--	--	--
10...	1130	946	265	--	15.0	--	--	--	--	--	--
11...	0840	1120	288	--	14.0	--	--	.36	.020	.38	.030
JUL											
10...	0900	386	430	7.8	20.5	6.5	73	.81	.160	.97	.000
AUG											
05...	1400	536	393	7.8	20.0	7.0	79	.21	.000	.21	.010
SEP											
04...	1230	362	421	8.0	19.5	7.7	82	.55	.010	.56	.040

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHATE, TOTAL (MG/L AS PO4)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
APR											
23...	--	--	--	--	--	--	--	--	--	12	15
MAY											
09...	--	--	--	--	--	--	--	--	--	9	6.8
JUN											
04...	.07	.66	.72	1.5	6.7	.100	.06	.31	.020	46	59
05...	--	--	--	--	--	--	--	--	--	44	58
10...	--	--	--	--	--	--	--	--	--	29	74
11...	.04	.64	.67	1.1	4.6	.050	.06	.15	.020	32	97
JUL											
10...	.00	.61	.61	1.6	7.0	.080	.09	.25	.030	33	34
AUG											
06...	.01	.33	.34	.55	2.4	.050	.00	.15	.000	24	35
SEP											
04...	.05	.40	.44	1.0	4.4	.080	.06	.25	.020	19	19

Reproduced from best available copy.

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)
OCT 14...	1330	298	450	--	9.0	--	--	--	.59	--	--	.000
DEC 04...	1200	400	490	6.8	1.0	13.0	89	--	.76	--	--	.020
JAN 12...	1100	--	436	5.9	.0	12.2	82	1.2	.89	.87	3.9	.020
FEB 05...	0830	--	440	7.7	.0	12.6	85	--	.87	--	--	.020
17...	1345	550	--	--	4.5	--	--	--	--	--	--	--
20...	1100	1220	282	7.4	1.0	12.3	85	2.6	.94	.94	4.2	.030
21...	1930	1700	296	7.8	2.0	12.7	90	1.7	.98	.98	4.3	.020
23...	0930	1230	294	7.9	3.5	11.4	86	1.6	1.1	1.10	4.9	.020
MAR 04...	1100	555	360	7.5	4.5	12.0	92	1.2	--	.87	3.9	<.010
APR 08...	0825	363	430	8.0	10.5	10.2	91	--	--	--	--	<.010
MAY 13...	1630	1200	275	7.5	11.5	9.5	85	--	.38	--	--	.010
14...	1700	1300	--	--	--	--	--	--	--	--	--	--
16...	1100	943	--	--	--	--	--	--	--	--	--	--
JUN 11...	1000	332	430	7.7	18.0	7.9	82	--	.55	--	--	.020
JUL 07...	1400	264	432	8.4	22.0	8.0	92	--	.73	--	--	.020
27...	0915	239	235	--	--	--	--	--	--	--	--	--
AUG 05...	1545	273	435	8.1	21.0	8.3	91	.42	.01	.01	.00	<.010
SEP 16...	1430	228	430	8.1	17.0	8.7	89	--	.69	--	--	.020

DATE	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N)
OCT 14...	--	--	.59	--	.040	--	.05	--	.21	--	.25	--
DEC 04...	--	--	.78	--	.050	--	.06	--	.33	--	.38	--
JAN 12...	.030	.10	.91	.90	.120	.080	.15	.10	.28	.24	.40	--
FEB 05...	--	--	.89	--	.100	--	--	--	.35	--	.45	--
17...	--	--	--	--	--	--	--	--	--	--	--	--
20...	.020	.07	.97	.97	.080	.100	--	.13	.25	1.5	.33	--
21...	.020	.07	1.0	1.1	.100	.070	--	.09	.63	.57	.73	--
23...	.020	.07	1.1	1.1	.050	.040	--	.05	.54	.43	.59	--
MAR 04...	.010	.03	.88	.88	.060	.060	--	.08	.24	.29	.30	.00
APR 08...	--	--	.62	--	.040	--	--	--	.45	--	.49	--
MAY 13...	--	--	.39	--	.030	--	--	--	.75	--	.78	--
14...	--	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--	--
JUN 11...	--	--	.57	--	.040	--	--	--	.89	--	.93	--
JUL 07...	--	--	.75	--	.020	--	--	--	.56	--	.58	--
27...	--	--	--	--	--	--	--	--	--	--	--	--
AUG 05...	<.010	--	.01	.01	<.010	.020	--	.03	.48	.39	.48	.07
SEP 16...	--	--	.70	--	.030	--	--	--	.46	--	.49	--

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHATE, TOTAL (MG/L AS PO4)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P).	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
OCT												
14...	--	.84	3.7	.030	.00	.09	--	.000	--	--	2	1.6
DEC												
04...	--	1.2	5.1	.040	.09	.12	--	.030	--	--	7	7.6
JAN												
12...	.32	1.3	5.8	.030	<.03	.09	.020	<.010	<.010	<.03	--	--
FEB												
05...	--	1.3	5.9	.030	--	.09	--	.020	--	--	4	--
17...	--	--	--	--	--	--	--	--	--	--	18	27
20...	1.4	1.3	5.8	.070	--	.21	.130	.030	.100	.31	61	201
21...	.64	1.7	7.7	.060	--	.18	.020	.020	.010	.03	142	652
23...	.47	1.7	7.5	.050	--	.15	.030	.020	.010	.03	12	40
MAR												
04...	.35	1.2	5.2	.030	--	.09	.020	.020	<.010	--	7	10
APR												
08...	--	1.1	4.9	.030	--	.09	--	.010	--	--	6	5.9
MAY												
13...	--	1.2	5.2	.080	--	.25	--	<.010	--	--	27	87
14...	--	--	--	--	--	--	--	--	--	--	29	102
16...	--	--	--	--	--	--	--	--	--	--	9	23
JUN												
11...	--	1.5	6.6	.140	--	.43	--	.050	--	--	40	36
JUL												
07...	--	1.3	5.9	.070	--	.21	--	.040	--	--	18	13
27...	--	--	--	--	--	--	--	--	--	--	20	13
AUG												
05...	.41	.49	2.2	.080	--	.25	.050	<.010	.010	.03	7	5.2
SEP												
16...	--	1.2	5.3	.040	--	.12	--	.020	--	--	8	4.9

DATE	TIME	TURBIDITY (NTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY												
13...	1630	4.4	40	140	7.0	36	13	5.0	.2	7	1.6	130

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY												
13...	19	8.2	.1	6.1	1.2	187	165	.25	606	1	1	<10

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY												
13...	1	17	600	40	<4	30	<.1	8	0	70	60	30

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	PCB, DIS-SOLVED (UG/L)	PCN DISSOLV (UG/L)	ALDRIN, DIS-SOLVED (UG/L)	CHLOR-DANE, DIS-SOLVED (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	DDD, DIS-SOLVED (UG/L)	DDE, DIS-SOLVED (UG/L)	DDT, DIS-SOLVED (UG/L)	DI-AZINON, DIS-SOLVED (UG/L)
MAY											
13...	1630	<.1	<.10	<.01	<.10	.02	<.01	<.01	<.01	<.01	<.01
22...	1020	--	--	--	--	--	--	--	--	--	--

DATE	DI-ELDRIN DIS-SOLVED (UG/L)	ENDO-SULFAN DISSOLV (UG/L)	ENDRIN, DIS-SOLVED (UG/L)	ETHION DISSOLV (UG/L)	HEPTA-CHLOR, DIS-SOLVED (UG/L)	HEPTA-CHLOR EPOXIDE DIS-SOLVED (UG/L)	LINDANE DIS-SOLVED (UG/L)	MALA-THION, DIS-SOLVED (UG/L)	METHO-MYL TOTAL (UG/L)	METH-OXY-CHLOR DISSOLV (UG/L)	METHYL PARA-THION, DIS-SOLVED (UG/L)
MAY											
13...	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	.0	<.01	<.01
22...	--	--	--	--	--	--	--	--	.0	--	--

DATE	METHYL-TRI-THION DISSOLV (UG/L)	MIREX, DIS-SOLVED (UG/L)	PARA-THION, DIS-SOLVED (UG/L)	PER-THANE DISSOLV (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	TOX-APHENE, DIS-SOLVED (UG/L)	TRI-THION DISSOLV (UG/L)
MAY										
13...	<.01	<.01	<.01	<.01	.0	.00	<.01	<.01	<1.0	<.01
22...	--	--	--	--	.0	.00	--	--	--	--

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	---	---	---	---	---	---	16	13	33	30
2	---	---	---	---	---	---	---	---	56	46	19	19
3	---	---	---	---	---	---	---	---	56	70	16	16
4	---	---	---	---	46	59	---	---	29	37	19	19
5	---	---	---	---	44	58	---	---	27	35	17	18
6	---	---	---	---	---	---	---	---	26	36	17	18
7	---	---	---	---	---	---	---	---	16	24	15	15
8	---	---	---	---	---	---	---	---	20	27	12	11
9	---	---	9	6.8	---	---	---	---	17	19	14	10
10	---	---	---	---	29	74	33	34	15	14	13	10
11	---	---	---	---	32	97	---	---	19	17	13	10
12	---	---	---	---	---	---	---	---	19	17	13	9.8
13	---	---	---	---	---	---	---	---	24	21	14	10
14	---	---	---	---	---	---	---	---	35	46	10	7.6
15	---	---	---	---	---	---	---	---	29	40	13	9.9
16	---	---	---	---	---	---	---	---	23	29	13	9.9
17	---	---	---	---	---	---	---	---	14	20	22	23
18	---	---	---	---	---	---	---	---	18	30	24	27
19	---	---	---	---	---	---	---	---	14	24	19	21
20	---	---	---	---	---	---	---	---	13	22	17	19
21	---	---	---	---	---	---	20	18	15	26	13	15
22	---	---	---	---	---	---	18	16	15	26	18	20
23	12	15	---	---	---	---	20	18	16	29	12	13
24	---	---	---	---	---	---	19	17	11	22	9	9.0
25	---	---	---	---	---	---	14	10	14	29	10	9.3
26	---	---	---	---	---	---	17	12	15	25	7	6.3
27	---	---	---	---	---	---	19	14	15	20	12	10
28	---	---	---	---	---	---	23	18	33	36	9	7.6
29	---	---	---	---	---	---	21	17	18	17	6	4.8
30	---	---	---	---	---	---	22	18	15	13	7	5.0
31	---	---	---	---	---	---	19	16	16	13	---	---
TOTAL									---	843	---	413.2

04102420 PAW PAW RIVER NEAR HARTFORD, MI--CONTINUED

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9	6.7	3	2.8	5	4.3	7	7.0	5	4.6	7	13
2	12	9.1	3	2.7	6	6.0	8	8.0	8	7.1	12	20
3	18	14	4	3.5	6	6.4	8	7.8	13	12	9	14
4	5	4.0	4	3.5	7	7.5	8	7.6	10	8.9	11	16
5	6	4.7	5	4.3	4	4.5	8	7.1	4	3.6	7	10
6	7	5.4	5	4.2	4	4.9	8	6.5	8	7.1	9	12
7	5	3.8	3	2.5	18	26	8	6.9	12	11	11	14
8	6	4.4	3	2.5	16	27	9	8.5	18	16	11	14
9	5	3.6	2	1.6	14	26	8	8.0	9	8.3	8	9.8
10	5	3.6	2	1.6	14	27	6	5.7	10	9.2	7	8.1
11	4	2.9	1	.76	12	26	6	5.5	12	11	8	9.0
12	4	2.9	2	1.5	11	25	7	6.2	12	11	6	6.8
13	3	2.3	1	.75	12	24	7	6.1	14	13	8	9.1
14	2	1.6	2	1.5	9	15	6	5.2	14	14	6	6.7
15	7	5.5	2	1.5	7	9.8	6	5.2	16	17	7	7.6
16	8	6.2	3	2.2	8	9.7	7	6.0	17	21	9	9.5
17	5	4.2	2	1.4	9	10	7	6.0	18	29	7	7.3
18	5	4.6	1	.73	11	11	6	5.2	25	59	6	6.1
19	5	4.7	1	.72	8	7.4	8	6.9	35	94	6	5.9
20	4	3.8	1	.70	7	6.2	6	5.2	61	212	7	6.9
21	4	3.8	1	.69	7	6.0	5	4.4	142	659	14	14
22	4	3.7	1	.69	7	6.0	7	5.7	25	101	10	10
23	4	3.6	2	1.4	8	6.7	6	5.0	12	38	8	8.1
24	4	3.6	2	1.4	8	6.6	6	5.1	11	31	7	7.1
25	4	3.7	1	.74	8	6.4	6	5.0	8	22	8	8.1
26	4	3.9	1	.74	7	6.3	7	6.3	6	15	10	10
27	4	3.9	2	1.5	7	5.9	7	7.1	7	16	4	4.3
28	3	2.9	4	3.1	7	5.3	25	26	7	15	8	8.8
29	3	3.0	5	4.1	7	5.7	6	6.2	---	---	8	9.0
30	3	3.0	5	4.1	8	7.0	7	7.1	---	---	12	14
31	3	2.9	---	---	7	6.6	6	5.8	---	---	11	13
TOTAL	---	136.0	---	59.42	---	352.2	---	214.3	---	1465.8	---	312.2

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	10	11	23	39	25	26	27	20	18	12	16	13
2	11	13	152	265	26	26	23	17	20	14	20	18
3	12	13	21	37	27	27	27	20	16	11	22	21
4	14	15	20	33	30	27	20	15	18	13	26	24
5	9	9.4	37	53	30	26	18	13	17	13	20	16
6	8	8.1	21	27	33	29	19	14	18	13	16	12
7	7	7.0	23	26	32	27	18	13	13	9.4	12	8.9
8	6	5.9	21	22	30	24	17	12	12	8.5	14	10
9	8	8.1	15	15	35	28	16	11	11	8.0	16	11
10	10	11	18	21	37	32	13	8.7	10	7.2	18	12
11	10	11	22	52	40	36	14	9.2	12	8.5	7	4.7
12	12	14	188	455	44	39	22	14	10	7.0	13	8.6
13	18	23	81	243	48	49	19	13	11	7.5	6	3.9
14	21	30	76	273	53	61	18	12	15	10	7	4.5
15	26	39	20	59	48	55	18	12	12	8.0	7	4.4
16	22	34	9	23	41	79	17	11	8	5.5	9	5.6
17	16	24	38	82	32	70	15	9.7	14	9.6	7	4.5
18	20	29	32	58	24	54	15	9.5	8	5.4	7	4.8
19	24	32	29	46	26	51	14	8.9	8	5.3	7	4.9
20	26	32	69	94	28	42	14	8.9	8	5.2	6	4.1
21	28	32	15	18	32	39	13	8.5	11	6.9	9	6.1
22	30	33	15	17	64	74	14	9.1	11	6.7	8	6.1
23	22	41	20	21	48	51	17	11	11	6.8	13	11
24	16	32	18	19	40	41	10	6.3	10	6.2	11	9.5
25	126	256	23	25	36	37	17	11	5	3.1	16	14
26	13	31	19	22	31	30	15	9.3	9	5.6	10	8.3
27	15	37	23	26	37	34	20	13	9	6.2	15	13
28	17	37	21	24	31	26	38	26	9	6.8	8	7.3
29	21	41	25	28	24	20	20	15	10	8.3	15	14
30	22	40	23	27	29	22	22	17	12	10	67	99
31	---	---	24	26	---	---	17	13	14	11	---	---
TOTAL	---	949.5	---	2176	---	1182	---	391.1	---	258.7	---	384.2

TOTAL LOAD FOR YEAR: 7881.42 TONS.

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW¼ SE¼ sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft (12 m) upstream from bridge on Coloma Road, 0.8 mi (1.3 km) east of Riverside.

DRAINAGE AREA.--390 mi^2 (1,010 km^2).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft (179.466 m) National Geodetic Vertical Datum of 1929. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 439 ft^3/s (12.43 m^3/s), 15.29 in/yr (388 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,830 ft^3/s (80.1 m^3/s) Mar. 9, 1979, gage height, 10.11 ft (3.082 m); minimum, 99 ft^3/s (2.80 m^3/s) July 5, 1964, gage height, 2.66 ft (0.811 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,910 ft^3/s (54.1 m^3/s) Feb. 23, gage height, 9.16 ft (2.792 m); minimum, 260 ft^3/s (7.36 m^3/s) Aug. 23, gage height, 3.94 ft (1.201 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	399	454	432	470	450	1060	509	850	539	382	337	350
2	402	451	454	480	450	985	505	795	512	373	312	364
3	423	446	485	470	450	913	500	763	501	367	310	387
4	445	445	499	450	450	859	499	747	488	362	318	393
5	444	445	497	440	450	810	487	729	456	356	323	366
6	428	440	501	430	450	773	473	697	439	352	329	340
7	416	437	531	430	450	736	461	651	430	346	328	328
8	407	433	602	450	450	704	450	605	413	339	328	325
9	399	429	692	470	450	676	459	566	406	330	326	315
10	391	424	712	470	450	650	460	579	419	321	325	302
11	384	419	693	450	460	626	475	824	421	311	321	296
12	382	412	703	440	470	602	496	1140	414	307	314	294
13	385	404	746	440	480	587	506	991	461	314	310	288
14	389	407	774	430	500	575	533	1060	580	315	304	282
15	395	408	774	430	520	562	570	1330	686	311	302	278
16	403	404	746	430	580	546	583	1340	708	311	302	283
17	417	399	707	430	665	533	584	1200	676	306	304	286
18	437	394	670	430	940	516	596	1060	688	300	301	293
19	443	394	635	430	1320	505	601	948	719	295	297	307
20	437	391	580	430	1280	495	596	860	719	298	290	307
21	437	388	540	430	1400	485	575	778	687	301	283	302
22	436	384	520	430	1770	486	555	709	652	304	270	310
23	434	384	500	430	1860	483	653	651	603	302	263	340
24	433	388	480	430	1670	478	778	612	558	298	263	359
25	441	393	460	430	1470	473	769	583	524	294	262	371
26	449	393	440	430	1330	477	747	583	501	295	261	385
27	452	394	430	450	1220	482	774	583	474	297	277	395
28	451	405	420	500	1150	484	848	568	443	313	316	395
29	450	417	410	500	---	485	920	557	419	335	340	394
30	452	425	430	490	---	496	927	569	398	346	372	531
31	454	---	450	470	---	506	---	561	---	353	368	---
TOTAL	13115	12407	17513	13890	23585	19048	17889	24489	15934	10034	9556	10166
MEAN	423	414	565	448	842	614	596	790	531	324	308	339
MAX	454	454	774	500	1860	1060	927	1340	719	382	372	531
MIN	382	384	410	430	450	473	450	557	398	294	261	278
CFSM	1.09	1.06	1.45	1.15	2.16	1.57	1.53	2.03	1.36	.83	.79	.87
IN.	1.25	1.18	1.67	1.32	2.25	1.82	1.71	2.34	1.52	.96	.91	.97

CAL YR 1980 TOTAL 196506 MEAN 537 MAX 1160 MIN 336 CFSM 1.38 IN 18.74
WTR YR 1981 TOTAL 187626 MEAN 514 MAX 1860 MIN 261 CFSM 1.32 IN 17.90

04102700 BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW¼ sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft (15 m) upstream from bridge on 66th Street, 4.9 mi (7.9 km) northwest of Bangor.

DRAINAGE AREA.--83.6 mi² (216.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 105 ft³/s (2.974 m³/s), 17.06 in/yr (433 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,680 ft³/s (47.6 m³/s), revised, Apr. 19, 1975, gage height, 13.16 ft (4.011 m); minimum, 20 ft³/s (0.57 m³/s) Sept. 28, 1966, gage height, 1.83 ft (0.558 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 9	1800	454	12.9	8.23	2.509	May 11	2100	975	27.6	10.84	3.304
Feb. 19	0900	*1170	33.1	*11.56	3.523						

Minimum discharge, 29 ft³/s (0.82 m³/s) Aug. 24-26, Sept. 15, 16; minimum gage height, 2.08 ft (0.634 m) Aug. 25, 26.

REVISIONS.--Revised maximum discharges for water years 1973-75 and 1979, in cubic feet per second, are given below. These figures supersede those published in the reports of 1973-75 and 1979.

Water year	Date	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Water year	Date	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
1973	Dec. 31, 1972	1050	29.7	11.15	3.399	1975	Apr. 19, 1975	1680	47.6	13.16	4.011
1974	Jan. 21, 1974	832	23.6	10.27	3.130	1979	Mar. 5, 1979	1350	38.2	12.18	3.712

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	70	90	80	70	186	108	194	64	45	35	39
2	55	67	118	75	70	171	94	147	60	44	34	38
3	68	64	147	75	70	151	85	121	62	43	41	36
4	76	69	134	72	70	138	85	105	74	42	40	35
5	68	76	109	72	70	132	83	95	70	41	38	34
6	61	75	112	72	70	124	77	88	63	40	38	33
7	58	72	150	70	72	114	71	81	57	39	38	33
8	55	69	270	70	72	107	68	75	53	38	39	35
9	53	66	424	70	72	108	85	71	54	38	38	34
10	51	64	402	70	73	110	92	116	57	37	36	33
11	49	61	302	70	74	108	163	718	54	36	35	32
12	50	59	217	70	76	102	205	788	51	36	34	31
13	55	58	165	70	80	98	180	572	69	38	33	30
14	56	58	135	70	90	92	177	432	131	38	33	30
15	57	58	117	70	120	89	180	321	158	37	36	30
16	61	57	104	68	159	86	147	218	134	36	35	30
17	75	56	93	65	239	83	120	159	102	36	34	32
18	102	55	86	65	560	79	104	131	79	35	33	34
19	97	54	80	65	1080	77	95	114	68	35	32	33
20	83	54	80	65	828	77	98	102	60	35	31	32
21	73	54	75	65	656	77	92	93	59	36	30	33
22	67	54	75	65	557	80	89	85	106	35	30	66
23	63	54	75	65	521	82	253	80	109	34	30	52
24	62	58	75	65	466	79	298	76	86	33	29	43
25	76	60	75	68	383	76	270	76	73	33	29	40
26	93	59	72	70	294	84	207	92	63	34	29	47
27	97	59	72	70	227	108	151	101	56	34	54	77
28	90	61	72	70	198	106	128	90	51	39	48	73
29	83	71	72	70	---	94	204	80	48	41	55	61
30	77	79	75	70	---	96	235	75	46	39	47	91
31	73	---	80	70	---	114	---	69	---	36	41	---
TOTAL	2141	1871	4153	2152	7317	3228	4244	5565	2217	1163	1135	1247
MEAN	69.1	62.4	134	69.4	261	104	141	180	73.9	37.5	36.6	41.6
MAX	102	79	424	80	1080	186	298	788	158	45	55	91
MIN	49	54	72	65	70	76	68	69	46	33	29	30
CFSM	.83	.75	1.60	.83	3.12	1.24	1.69	2.15	.88	.45	.44	.50
IN.	.95	.83	1.85	.96	3.26	1.44	1.89	2.48	.99	.52	.51	.55

CAL YR 1980 TOTAL 43222 MEAN 118 MAX 1020 MIN 42 CFSM 1.41 IN 19.23
WTR YR 1981 TOTAL 36433 MEAN 99.8 MAX 1080 MIN 29 CFSM 1.19 IN 16.21

04102700 BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April 1980 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: July 1980 to current year.
SUSPENDED-SEDIMENT DISCHARGE: July 1980 to current year.

REMARKS.--Sediment samples were collected on an approximate daily basis by a local observer. Water quality samples were collected about once a month. Daily water temperature record based on once-daily measurement during the early morning hours.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily, 23.0°C June 15, July 9, 1981; minimum daily, 0.0°C on several days during winter period.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 265 mg/L September 2, 1980; minimum daily mean, 1 mg/L on several days during November 1980.
SEDIMENT LOADS: Maximum daily, 163 tons (148 tonnes) May 11, 1981; minimum daily, 0.02 tons (0.018 tonnes) December 22, 1980.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
APR											
24...	1515	99	455	--	12.0	--	--	--	--	--	--
MAY											
06...	1345	72	443	--	17.0	--	--	--	--	--	--
JUN											
04...	1340	234	398	--	17.5	--	--	.58	.020	.60	.000
09...	1810	594	215	--	15.5	--	--	.59	.020	.61	.110
JUL											
10...	1730	59	435	8.0	22.0	7.8	90	.37	.010	.39	.010
AUG											
07...	1330	96	363	7.7	22.0	7.4	85	.29	.020	.31	.020
SEP											
05...	0730	107	388	8.1	20.0	7.8	82	.24	.010	.25	.030

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHATE, TOTAL (MG/L AS PO4)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
APR											
24...	--	--	--	--	--	--	--	--	--	8	2.2
MAY											
06...	--	--	--	--	--	--	--	--	--	--	--
JUN											
04...	.00	1.0	1.00	1.6	7.1	.100	.15	.31	.050	54	37
09...	.14	.70	.81	1.4	6.3	.020	.03	.06	.009	23	43
JUL											
10...	.01	.37	.38	.76	3.4	.060	.09	.18	.030	35	5.8
AUG											
07...	.03	.29	.31	.62	2.7	.090	.06	.28	.020	28	7.3
SEP											
05...	.04	.55	.58	.83	3.7	.070	.12	.21	.040	33	9.5

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04102700 BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	NITRO-GEN DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)
OCT												
15...	1215	57	475	--	9.0	--	--	--	.27	--	--	.010
DEC												
05...	1100	108	440	7.4	2.0	13.1	93	--	.46	--	--	.010
JAN												
13...	1000	70	485	7.1	.0	12.5	85	.75	.36	.37	1.6	.010
FEB												
05...	1330	--	469	7.4	.0	13.5	91	--	.42	--	--	<.010
17...	1030	212	--	--	2.5	--	--	--	--	--	--	--
20...	1410	827	204	6.9	2.0	--	--	1.7	.84	--	--	.020
21...	1320	680	228	7.3	2.0	--	--	1.3	.83	--	--	.010
MAR												
05...	0900	133	350	7.6	3.0	12.6	92	.85	.79	.44	1.9	<.010
APR												
08...	1530	70	440	8.2	11.5	10.2	91	--	.22	--	--	<.010
MAY												
13...	1130	572	247	7.8	11.0	--	--	--	.47	--	--	.020
16...	1010	219	--	--	12.0	--	--	--	--	--	--	--
JUN												
11...	1545	53	460	8.1	18.0	8.7	91	--	.31	--	--	.030
JUL												
06...	1445	40	465	8.0	22.0	8.8	102	--	.34	--	--	<.010
AUG												
06...	1300	38	489	8.2	21.0	8.8	97	.56	.31	.29	1.3	<.010
SEP												
17...	1315	--	480	8.0	13.0	9.5	93	--	.31	--	--	.010

DATE	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,NH4 + ORG. SUSP. TOTAL (MG/L AS N)
OCT												
15...	--	--	.28	--	.030	--	.04	--	.31	--	.34	--
DEC												
05...	--	--	.47	--	.070	--	.09	--	.26	--	.33	--
JAN												
13...	<.010	--	.37	.37	.080	.110	.10	.14	.30	.27	.38	--
FEB												
05...	--	--	.42	--	.090	--	--	--	.32	--	.41	--
17...	--	--	--	--	--	--	--	--	--	--	--	--
20...	.010	.03	.86	.83	.080	.070	--	.09	.71	.61	.79	--
21...	.010	.03	.84	.77	.060	.070	--	.09	.74	.45	.80	--
MAR												
05...	.010	.03	.79	.45	.110	.080	--	.10	.24	.32	.35	.00
APR												
08...	--	--	.22	--	.060	--	--	--	.26	--	.32	--
MAY												
13...	--	--	.49	--	.090	--	--	--	1.0	--	1.10	--
16...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
11...	--	--	.34	--	.050	--	--	--	.41	--	.46	--
JUL												
06...	--	--	.34	--	<.010	--	--	--	--	--	.50	--
AUG												
06...	<.010	--	.31	.24	.050	.030	--	.04	.35	.24	.40	.13
SEP												
17...	--	--	.32	--	.030	--	--	--	.23	--	.26	--

04102700 BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHATE, TOTAL (MG/L AS PO4)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
OCT 15...	--	.62	2.7	.040	.03	.12	--	.010	--	--	4	.62
DEC 05...	--	.80	3.5	.030	.12	.09	--	.040	--	--	8	2.3
JAN 13...	.38	.75	3.3	.030	<.03	.09	.010	<.010	<.010	--	3	.57
FEB 05...	--	.83	3.7	.030	--	.09	--	.010	--	--	--	--
17...	--	--	--	--	--	--	--	--	--	--	42	24
20...	.68	1.7	7.3	.060	--	.18	.030	.040	.020	.06	17	38
21...	.52	1.6	7.3	.060	--	.18	.040	.030	.020	.06	12	22
MAR 05...	.40	1.1	5.0	.040	--	.12	.020	.020	.020	.06	15	5.4
APR 08...	--	.54	2.4	.030	--	.09	--	.020	--	--	9	1.7
MAY 13...	--	1.6	7.0	.060	--	.18	--	.050	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	28	17
JUN 11...	--	.80	3.5	.060	--	.18	--	.050	--	--	20	2.9
JUL 06...	--	.84	3.7	.050	--	.15	--	.030	--	--	8	.86
AUG 06...	.27	.71	3.1	.050	--	.15	.020	.030	.030	.04	7	.72
SEP 17...	--	.58	2.6	.050	--	.15	--	.030	--	--	6	--

DATE	TIME	TURBIDITY (NTU)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)
MAY 13...	1130	10	50	120	24	31	9.8	6.0	.2	10	2.0	94

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
MAY 13...	12	11	.1	4.7	1.5	161	133	.22	249	0	1	10

DATE	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
MAY 13...	1	22	580	12	<4	50	.1	6	0	90	80	30

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04102700 BLACK RIVER NEAR BANGOR, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	AME-TRYNE TOTAL	ATRA-TONE TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CYAN-AZINE TOTAL (UG/L)	CYPRA-ZINE TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	METHO-MYL TOTAL (UG/L)	PROME-TONE TOTAL (UG/L)
MAY										
13...	1130	<.10	<.10	1.0	<.10	<.10	.15	<.01	--	<.1
22...	0900	--	--	--	--	--	--	--	.0	--

DATE	PROME-TRYNE TOTAL (UG/L)	PRO-PAZINE TOTAL (UG/L)	PROPHAM TOTAL (UG/L)	SEVIN, TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	SIME-TONE TOTAL (UG/L)	SIME-TRYNE TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
MAY									
13...	.2	<.10	--	--	<.01	<.10	<.10	<.1	<.01
22...	--	--	.0	.00	--	--	--	--	--

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1										---	16.0	20.5
2										---	17.0	20.5
3										---	16.5	20.0
4										---	17.0	20.5
5										---	19.0	20.0
6										---	18.0	20.0
7										---	18.0	19.0
8										---	---	18.5
9										---	19.0	20.0
10										---	---	17.0
11										---	18.0	16.0
12										---	17.0	17.0
13										---	16.0	17.0
14										---	17.0	18.5
15										---	18.0	17.0
16										---	---	15.5
17										---	16.0	15.0
18										---	16.0	14.5
19										---	17.0	15.0
20										---	18.0	17.5
21										18.0	20.0	19.0
22										17.0	20.0	19.0
23										16.0	19.0	17.5
24										15.0	19.0	14.5
25										15.0	20.0	14.5
26										17.0	20.0	14.0
27										16.0	20.0	12.0
28										15.0	21.0	12.5
29										15.0	21.5	13.0
30										14.0	22.0	14.0
31										15.0	21.0	---

04102700 BLACK RIVER NEAR BANGOR, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	7.0	4.0	1.0	.0	4.0	13.0	12.0	16.0	19.5	18.0	22.0
2	14.5	6.0	5.0	.0	.0	3.0	9.0	10.5	17.0	19.5	19.0	20.0
3	13.0	7.0	1.5	.5	.0	2.5	12.0	12.0	18.5	21.0	20.0	20.0
4	11.0	9.0	1.0	.0	.0	4.0	14.0	14.5	18.0	19.0	21.0	19.5
5	10.0	9.0	---	.0	.5	4.0	10.0	17.0	19.0	21.0	20.0	18.0
6	9.0	6.5	---	.0	.0	3.5	6.5	11.0	19.0	20.0	20.5	19.5
7	9.0	8.0	7.0	.0	1.0	2.0	7.0	10.0	20.0	20.0	20.0	18.0
8	11.0	8.0	7.5	.0	.5	2.0	11.0	10.0	20.0	22.0	19.5	19.0
9	11.0	9.0	6.0	.0	.0	3.0	11.0	12.0	17.5	23.0	18.0	18.0
10	10.0	8.0	4.0	.0	.5	5.0	11.0	12.0	17.0	20.0	21.5	19.0
11	11.0	6.5	2.0	.0	.5	5.0	12.5	7.0	17.0	19.0	---	19.0
12	9.0	5.0	1.5	---	.0	5.0	12.0	6.0	17.0	21.0	---	20.0
13	8.0	5.5	2.0	---	.5	5.5	11.0	9.5	19.0	22.0	---	20.0
14	8.0	7.0	2.0	---	.0	5.0	12.0	12.0	20.0	20.0	---	20.0
15	8.5	6.0	1.0	---	.0	5.0	10.0	10.0	23.0	20.5	---	---
16	10.0	6.0	1.0	---	1.0	5.0	10.0	12.0	22.0	22.0	---	16.0
17	13.0	4.5	.0	---	2.0	5.0	13.0	13.0	19.0	19.0	---	13.0
18	13.0	4.0	2.0	---	1.0	---	14.0	12.0	---	20.0	16.0	13.0
19	11.0	3.5	1.0	---	.5	3.0	12.0	12.0	19.5	21.5	---	14.0
20	10.0	3.0	.0	.0	2.0	3.0	9.0	12.0	22.0	21.0	19.0	14.0
21	9.0	4.0	1.0	1.5	2.0	2.5	9.0	16.0	20.5	20.0	19.0	14.0
22	8.0	3.5	.0	2.0	3.0	5.0	10.5	14.5	18.0	17.0	19.0	12.0
23	8.0	4.5	.5	1.0	3.0	5.5	11.0	16.0	18.0	17.0	20.0	12.0
24	8.0	5.0	.0	1.0	4.0	---	8.5	17.0	19.0	18.0	20.0	13.0
25	8.5	5.0	.5	2.0	3.0	6.0	9.0	17.0	20.5	19.0	20.0	14.0
26	6.5	4.0	.0	3.0	2.5	7.5	9.0	18.0	19.0	21.0	20.0	15.0
27	5.5	4.0	.0	2.0	3.0	7.0	11.0	18.5	17.0	18.5	20.0	---
28	5.5	3.0	.0	1.5	3.0	8.0	14.0	17.0	18.0	17.0	20.0	14.0
29	5.0	3.0	1.0	1.0	---	11.0	11.0	17.0	19.0	15.0	20.0	13.0
30	4.0	3.0	.0	.0	---	11.0	11.0	19.0	21.0	16.5	21.0	---
31	5.5	---	.0	.5	---	11.0	---	16.5	---	17.0	21.0	---

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---			---	---	---	---	16	1.8	31	6.4
2	---	---			---	---	---	---	17	3.5	265	94
3	---	---			---	---	---	---	133	103	65	33
4	---	---			54	37	---	---	41	28	37	14
5	---	---			---	---	---	---	36	18	27	7.7
6	---	---			---	---	---	---	33	13	26	6.1
7	---	---			---	---	---	---	31	8.6	27	5.4
8	---	---			---	---	---	---	30	7.3	27	5.0
9	---	---			23	43	---	---	27	6.0	27	4.8
10	---	---			---	---	35	5.8	27	5.5	22	3.9
11	---	---			---	---	---	---	28	5.9	21	3.3
12	---	---			---	---	---	---	29	7.0	17	2.4
13	---	---			---	---	---	---	27	6.4	21	3.3
14	---	---			---	---	---	---	75	33	23	4.2
15	---	---			---	---	---	---	56	33	19	3.4
16	---	---			---	---	---	---	80	37	21	3.5
17	---	---			---	---	---	---	91	40	138	70
18	---	---			---	---	---	---	47	28	44	30
19	---	---			---	---	---	---	33	17	32	17
20	---	---			---	---	---	---	32	17	27	10
21	---	---			---	---	65	16	46	34	27	9.4
22	---	---			---	---	45	12	27	19	22	6.6
23	---	---			---	---	30	6.8	31	17	19	5.0
24	8	2.2			---	---	27	5.1	28	11	19	4.5
25	---	---			---	---	22	3.4	26	8.0	17	3.6
26	---	---			---	---	20	2.7	24	6.4	17	3.6
27	---	---			---	---	21	2.9	29	6.8	14	2.9
28	---	---			---	---	19	2.8	21	4.4	12	2.3
29	---	---			---	---	20	2.8	20	3.8	11	1.9
30	---	---			---	---	19	2.5	21	3.6	12	1.9
31	---	---			---	---	20	2.4	19	3.1	---	---
TOTAL									---	536.1	---	369.1

04102700 BLACK RIVER NEAR BANGOR, MI--CONTINUED

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12	1.8	3	.57	4	.97	8	1.7	6	1.1	19	9.4
2	12	1.8	2	.36	8	2.5	8	1.6	5	.95	18	8.2
3	16	2.9	3	.52	14	5.6	7	1.4	5	.95	16	6.5
4	15	3.1	3	.56	8	2.9	8	1.6	87	16	18	6.7
5	9	1.7	4	.82	8	2.4	6	1.2	5	.95	15	5.3
6	9	1.5	1	.20	6	1.8	8	1.6	6	1.1	14	4.7
7	8	1.3	2	.39	10	4.1	6	1.1	6	1.2	10	3.1
8	8	1.2	3	.56	37	27	8	1.5	5	.97	10	2.9
9	8	1.1	3	.53	36	41	7	1.3	6	1.2	10	2.9
10	8	1.1	2	.35	20	21	7	1.3	6	1.2	12	3.6
11	6	.79	2	.33	16	13	14	2.6	6	1.2	12	3.5
12	5	.68	3	.48	13	7.5	7	1.3	7	1.4	10	2.8
13	5	.74	17	2.7	9	4.0	3	.57	7	1.5	9	2.4
14	6	.91	3	.47	14	5.1	3	.57	9	2.2	8	2.0
15	5	.77	1	.16	10	3.2	4	.76	7	2.3	9	2.2
16	6	.99	2	.31	8	2.2	4	.73	10	4.3	7	1.6
17	11	2.2	1	.15	7	1.8	5	.88	40	25	5	1.1
18	14	3.9	4	.59	7	1.6	6	1.1	56	81	7	1.5
19	9	2.4	3	.44	7	1.5	8	1.4	24	82	8	1.7
20	5	1.1	3	.44	4	.86	9	1.6	12	29	7	1.5
21	5	.99	3	.44	5	1.0	12	2.1	11	19	4	.83
22	4	.72	3	.44	9	.02	9	1.6	14	20	4	.86
23	4	.68	3	.44	6	1.2	9	1.6	13	18	4	.89
24	3	.50	2	.31	9	1.8	8	1.4	16	20	8	1.7
25	4	.82	1	.16	7	1.4	7	1.3	31	32	5	1.0
26	6	1.5	3	.48	7	1.4	9	1.7	21	16	42	9.5
27	8	2.1	1	.16	4	.78	15	2.8	21	13	14	4.1
28	11	2.7	1	.16	6	1.2	12	2.3	22	12	11	3.1
29	3	.67	3	.58	7	1.4	12	2.3	---	---	8	2.0
30	4	.83	3	.64	8	1.6	5	.95	---	---	9	2.3
31	4	.79	---	---	8	1.7	5	.95	---	---	25	7.7
TOTAL	---	44.28	---	14.74	---	163.53	---	44.81	---	405.52	---	107.58

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	14	4.1	31	16	23	4.0	14	1.7	15	1.4	12	1.3
2	13	3.3	33	13	20	3.2	17	2.0	15	1.4	11	1.1
3	10	2.3	25	8.2	25	4.2	14	1.6	25	2.8	8	.78
4	13	3.0	26	7.4	35	7.0	15	1.7	17	1.8	9	.85
5	10	2.2	27	6.9	31	5.9	9	1.0	12	1.2	16	1.5
6	7	1.5	30	7.1	28	4.8	10	1.1	10	1.0	11	.98
7	7	1.3	29	6.3	25	3.8	12	1.3	13	1.3	13	1.2
8	8	1.5	20	4.1	25	3.6	11	1.1	11	1.2	15	1.4
9	15	3.4	25	4.8	28	4.1	12	1.2	19	1.9	10	.92
10	15	3.7	29	9.2	37	5.7	6	.60	11	1.1	9	.80
11	127	56	76	163	25	3.6	8	.78	10	.95	9	.78
12	57	31	20	48	23	3.2	9	.87	10	.92	9	.75
13	40	19	16	25	35	6.5	10	1.0	9	.80	8	.65
14	30	14	44	52	98	35	11	1.1	9	.80	9	.73
15	29	14	23	20	81	35	8	.80	8	.78	9	.73
16	28	11	26	15	47	17	6	.58	8	.76	9	.73
17	25	8.1	27	12	40	11	10	.97	7	.64	8	.69
18	27	7.6	23	8.1	38	8.1	9	.85	7	.62	8	.73
19	19	4.9	22	6.8	36	6.6	11	1.0	7	.60	7	.62
20	24	6.4	23	6.3	25	4.1	13	1.2	5	.42	8	.69
21	16	4.0	16	4.0	30	4.8	13	1.3	9	.73	6	.53
22	19	4.6	20	4.6	158	45	10	.95	7	.57	56	10
23	190	128	23	5.0	58	17	18	1.7	6	.49	24	3.4
24	55	44	19	3.9	33	7.7	14	1.2	6	.47	13	1.5
25	35	25	19	3.9	31	6.1	12	1.1	6	.47	13	1.4
26	33	18	25	6.2	26	4.4	13	1.2	9	.70	23	2.9
27	32	13	30	8.2	25	3.8	10	.92	41	6.0	51	11
28	47	16	28	6.8	21	2.9	16	1.7	15	1.9	36	7.1
29	55	30	29	6.3	21	2.7	15	1.7	23	3.4	21	3.5
30	40	25	25	5.1	19	2.4	7	.74	16	2.0	23	5.7
31	---	---	23	4.3	---	---	10	.97	12	1.3	---	---
TOTAL	---	505.9	---	497.5	---	273.2	---	35.93	---	40.42	---	64.96

TOTAL LOAD FOR YEAR: 2198.37 TONS.

04103500 KALAMAZOO RIVER AT MARSHALL, MI

LOCATION.--Lat 42°15'55", long 84°57'55", on line between sec.25 and 26, T.2 S., R.6 W., Calhoun County, Hydrologic Unit 04050003, on left bank at upstream side of bridge on South Kalamazoo Ave. in Marshall.

DRAINAGE AREA.--449 mi² (1,163 km²).

PERIOD OF RECORD.--October 1948 to current year. Monthly discharge only for October 1948, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 877.09 ft (267.337 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 11, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 315 ft³/s (8.921 m³/s), 9.53 in/yr (242 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,130 ft³/s (60.3 m³/s) Mar. 29, 1950, gage height, 8.20 ft (2.499 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 2, 1967; minimum gage height, 3.00 ft (0.914 m) May 16, 1963; minimum daily discharge, 31 ft³/s (0.88 m³/s) Aug. 16, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,170 ft³/s (33.1 m³/s) Feb. 20, gage height, 6.44 ft (1.963 m); minimum, 68 ft³/s (1.93 m³/s) Nov. 22, gage height, 3.46 ft (1.055 m); minimum daily, 182 ft³/s (5.15 m³/s) Nov. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	281	334	301	321	277	577	406	673	601	274	633	521
2	280	221	325	302	295	545	313	625	549	335	597	500
3	292	353	390	326	280	529	392	573	507	372	577	486
4	300	228	415	285	207	504	329	514	473	306	507	455
5	294	290	366	254	220	395	362	479	427	303	473	514
6	286	328	355	206	227	451	385	451	409	359	465	521
7	282	301	381	216	254	388	423	365	448	297	462	511
8	275	259	605	334	241	359	434	345	458	261	451	497
9	269	182	684	249	269	451	297	362	483	326	437	486
10	261	273	640	253	263	413	402	427	451	258	359	416
11	256	254	733	252	265	319	541	483	430	281	448	465
12	258	232	591	274	322	313	577	617	409	249	349	322
13	255	217	538	216	280	385	553	593	444	255	313	297
14	258	248	425	246	318	332	649	553	573	255	444	313
15	258	254	425	234	315	345	641	545	730	284	322	372
16	262	212	376	240	374	342	641	553	766	255	300	332
17	299	284	291	242	459	413	637	537	716	249	406	287
18	310	260	332	242	653	309	541	518	629	245	268	355
19	297	216	286	247	920	293	557	486	545	217	268	271
20	297	275	392	289	1070	362	462	441	486	277	268	277
21	287	277	243	254	1100	306	521	434	451	281	261	388
22	281	185	226	252	1010	309	392	388	476	265	261	458
23	273	221	273	258	977	300	609	300	476	392	255	441
24	272	296	221	246	914	329	698	313	448	329	277	444
25	300	230	208	244	851	362	725	448	427	349	261	349
26	309	231	289	282	752	342	677	427	423	277	258	444
27	314	249	287	300	685	322	585	406	368	355	281	284
28	316	269	198	295	613	372	581	409	382	448	335	402
29	412	276	288	262	---	368	541	409	388	537	500	427
30	285	232	310	204	---	409	673	427	322	637	533	458
31	315	---	279	268	---	444	---	569	---	669	553	---
TOTAL	8934	7687	11673	8093	14411	11888	15544	14670	14695	10197	12122	12293
MEAN	288	256	377	261	515	383	518	473	490	329	391	410
MAX	412	353	733	334	1100	577	725	673	766	669	633	521
MIN	255	182	198	204	207	293	297	300	322	217	255	271
CFSM	.64	.57	.84	.58	1.15	.85	1.15	1.05	1.09	.73	.87	.91
IN.	.74	.64	.97	.67	1.19	.98	1.29	1.22	1.22	.84	1.00	1.02

CAL YR 1980 TOTAL 128830 MEAN 352 MAX 1160 MIN 79 CFSM .78 IN 10.67
WTR YR 1981 TOTAL 142207 MEAN 390 MAX 1100 MIN 182 CFSM .87 IN 11.78

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW¼ sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft (107 m) upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--241 mi² (624 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft (250.924 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 27 to Feb 23, which are fair. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--48 years (water years 1931, 1935-81), 198 ft³/s (5.607 m³/s), 11.16 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft³/s (103 m³/s) Apr. 7, 1947, gage height, 4.48 ft (1.366 m), from floodmark; minimum, 22 ft³/s (0.62 m³/s) Aug. 14, 1934; minimum gage height, about -0.5 ft (-.152 m) in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,300 ft³/s (36.8 m³/s) Feb. 21; minimum 63 ft³/s (1.78 m³/s) Aug. 19, 20, 21, 24, 25, 26, gage height, 0.63 ft (0.192 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	208	171	150	130	130	560	253	436	156	110	99	211
2	176	164	180	130	130	496	247	433	150	107	89	194
3	164	156	213	130	130	454	235	410	145	106	87	168
4	155	154	228	130	130	415	225	375	135	117	90	150
5	150	150	263	130	130	382	213	342	128	110	86	140
6	148	148	284	130	130	349	204	307	124	101	83	138
7	145	151	310	130	130	316	194	278	117	96	83	136
8	138	150	354	128	130	294	184	255	117	92	78	128
9	146	149	441	125	130	273	192	237	124	89	82	116
10	218	147	632	125	135	257	199	254	125	86	85	111
11	278	144	721	125	140	247	283	329	122	83	92	104
12	273	140	658	125	140	237	363	416	116	80	89	97
13	118	137	560	125	150	232	495	578	176	83	83	91
14	115	136	467	123	160	223	683	652	241	87	78	95
15	118	134	382	123	170	218	706	582	284	91	81	95
16	122	134	322	123	200	213	715	500	328	87	80	95
17	134	130	247	122	270	208	684	427	347	88	76	95
18	154	129	254	121	500	198	588	371	319	84	71	95
19	167	127	218	121	800	194	510	327	263	79	67	95
20	180	125	171	122	1200	185	453	266	207	82	64	95
21	185	125	164	128	1300	180	402	250	173	82	65	100
22	180	125	149	130	1200	190	369	218	189	90	66	140
23	170	126	146	138	1150	180	401	200	189	87	69	135
24	160	127	144	142	1070	176	446	196	185	80	67	120
25	161	130	135	142	973	176	552	210	173	74	65	117
26	171	130	134	150	865	190	664	217	154	77	67	130
27	179	131	134	160	748	203	600	211	138	82	114	130
28	188	130	139	160	640	228	517	199	125	108	145	120
29	190	135	129	160	---	247	480	185	116	130	150	100
30	188	140	129	140	---	257	451	178	112	132	179	216
31	180	---	130	130	---	257	---	167	---	117	210	---
TOTAL	5259	4175	8590	4098	12981	8215	12508	10026	5278	2917	2840	3837
MEAN	170	139	277	132	464	265	417	323	176	94.1	91.6	128
MAX	278	171	721	160	1300	560	715	652	347	132	210	216
MIN	115	125	129	121	130	176	184	167	112	74	64	91
CFSM	.71	.58	1.15	.55	1.93	1.10	1.73	1.34	.73	.39	.38	.53
IN.	.81	.64	1.33	.63	2.00	1.27	1.93	1.55	.81	.45	.44	.59

CAL YR 1980 TOTAL 85365 MEAN 233 MAX 838 MIN 88 CFSM .97 IN 13.18
WTR YR 1981 TOTAL 80724 MEAN 221 MAX 1300 MIN 64 CFSM .92 IN 12.46

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW¼ sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft (6 m) upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi^2 (2,134 km^2).

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi (7.6 km) downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft (549 m) upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation, below 1,500 ft^3/s (42.5 m^3/s), caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 651 ft^3/s (18.44 m^3/s), 10.73 in/yr (273 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft^3/s (206 m^3/s) Apr. 7, 1947, gage height, 9.13 ft (2.783 m), site and datum then in use; minimum, 50 ft^3/s (1.42 m^3/s) Sept. 22, 1939, site then in use; minimum daily, 86 ft^3/s (2.44 m^3/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,330 ft^3/s (94.3 m^3/s) Feb. 21, gage height, 6.12 ft (1.865 m); minimum, 166 ft^3/s (4.70 m^3/s) Feb. 12, gage height, 3.01 ft (0.917 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	615	567	505	512	519	1550	846	1400	923	458	910	1060
2	572	572	683	500	491	1400	722	1360	909	449	840	943
3	556	539	721	450	400	1310	677	1260	855	523	830	840
4	553	540	729	420	463	1240	708	1140	783	548	790	730
5	547	540	800	400	421	1130	647	1050	708	464	692	750
6	541	541	810	400	428	965	659	959	641	494	665	750
7	545	540	1010	410	470	976	678	870	620	471	730	750
8	520	526	1140	435	470	840	687	805	669	443	683	750
9	498	491	1360	484	470	860	732	764	722	418	656	720
10	484	449	1470	463	484	900	649	911	710	456	580	620
11	464	533	1620	442	450	760	1130	1100	674	360	620	638
12	456	477	1530	463	414	720	1220	1230	639	375	638	596
13	456	449	1260	484	540	710	1310	1410	958	412	484	463
14	456	456	1100	484	564	730	1600	1470	1090	406	556	533
15	456	449	998	491	588	692	1660	1450	1270	421	600	484
16	456	463	877	491	647	692	1620	1340	1420	423	450	526
17	545	456	692	491	910	701	1570	1220	1390	408	560	498
18	580	464	683	498	1320	710	1490	1120	1250	391	390	491
19	580	456	596	498	2010	620	1330	1020	1060	392	388	526
20	580	421	498	505	3110	604	1210	924	883	391	388	477
21	580	456	470	519	3330	638	1100	749	793	450	383	542
22	580	414	450	519	3120	596	1060	708	847	436	376	758
23	560	414	450	526	2710	596	1430	640	828	476	376	728
24	548	442	450	512	2520	572	1590	650	775	492	376	642
25	580	484	450	505	2300	596	1590	799	742	496	394	559
26	588	442	460	533	2110	710	1630	859	687	456	428	681
27	588	442	470	548	1880	665	1560	799	631	458	596	708
28	588	470	480	556	1680	683	1400	768	575	820	588	597
29	604	484	484	540	---	710	1390	750	572	840	740	695
30	692	498	519	449	---	800	1400	817	562	890	900	997
31	596	---	519	407	---	850	---	850	---	932	1010	---
TOTAL	16964	14475	24284	14935	34819	25526	35295	31192	25186	15449	18617	20052
MEAN	547	483	783	482	1244	823	1177	1006	840	498	601	668
MAX	692	572	1620	556	3330	1550	1660	1470	1420	932	1010	1060
MIN	456	414	450	400	400	572	647	640	562	360	376	463
CFSM	.66	.59	.95	.59	1.51	1.00	1.43	1.22	1.02	.60	.73	.81
IN.	.77	.65	1.10	.67	1.57	1.15	1.59	1.41	1.14	.70	.84	.91

CAL YR 1980 TOTAL 257266 MEAN 703 MAX 1970 MIN 249 CFSM .85 IN 11.61
WTR YR 1981 TOTAL 276794 MEAN 758 MAX 3330 MIN 360 CFSM .92 IN 12.50

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW¼ sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft (5 m) downstream from bridge on EF Road, and 1.3 mi (2.1 km) north of Augusta.

DRAINAGE AREA.--38.9 mi^2 (100.8 km^2).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 42.9 ft^3/s (1.215 m^3/s), 14.98 in/yr (380 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 560 ft^3/s (15.9 m^3/s) June 27, 1978, gage height, 3.41 ft (1.039 m); minimum, 8.9 ft^3/s (0.25 m^3/s) Jan. 26, 1978, result of freezeup; minimum gage height, 0.65 ft (0.198 m) Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 106 ft^3/s (3.00 m^3/s) Apr. 14, gage height, 2.04 ft (0.622 m); minimum, 17 ft^3/s (0.48 m^3/s) Dec. 24, 25, gage height, 0.78 ft (0.238 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	42	49	42	37	59	53	60	38	27	30	49
2	39	41	63	41	38	57	49	55	37	27	29	67
3	40	41	63	40	37	54	46	52	36	26	32	58
4	39	43	58	40	39	52	47	49	36	26	32	56
5	38	43	53	40	39	51	46	48	35	25	30	48
6	38	42	54	40	38	49	45	47	34	30	29	40
7	38	42	76	40	38	47	42	45	33	30	29	39
8	38	41	84	40	37	46	41	44	34	28	28	39
9	37	41	80	40	37	46	50	60	37	27	29	37
10	37	40	74	40	36	45	48	94	36	26	29	35
11	37	39	65	40	42	45	75	85	34	25	29	33
12	38	39	58	40	42	45	95	75	34	25	28	33
13	38	39	55	40	41	44	99	70	54	28	27	36
14	38	40	51	40	41	42	102	66	73	28	27	34
15	42	40	48	39	40	42	97	60	69	27	33	32
16	44	39	47	39	46	47	81	55	62	27	32	31
17	49	38	42	39	62	46	69	52	55	27	30	33
18	52	38	41	36	83	44	61	48	47	25	28	35
19	48	39	39	38	100	43	59	45	42	28	27	33
20	46	39	40	39	99	43	60	43	38	31	26	31
21	44	40	40	38	90	42	56	41	40	31	25	32
22	42	39	39	38	81	42	56	40	48	30	25	42
23	42	42	40	38	80	41	82	39	45	28	24	39
24	43	45	39	37	80	41	85	43	42	26	24	36
25	49	44	37	38	77	41	77	52	40	25	24	34
26	49	42	37	40	70	49	66	50	41	27	24	38
27	47	42	36	40	62	56	59	48	38	28	36	60
28	46	45	39	40	60	52	60	45	36	37	45	63
29	44	46	41	38	---	50	68	44	33	39	49	53
30	43	46	41	36	---	51	66	43	30	36	50	63
31	43	---	41	35	---	52	---	40	---	33	50	---
TOTAL	1307	1237	1570	1211	1572	1464	1940	1638	1257	883	960	1259
MEAN	42.2	41.2	50.6	39.1	56.1	47.2	64.7	52.8	41.9	28.5	31.0	42.0
MAX	52	46	84	42	100	59	102	94	73	39	50	67
MIN	37	38	36	35	36	41	41	39	30	25	24	31
CFSM	1.09	1.06	1.30	1.01	1.44	1.21	1.66	1.36	1.08	.73	.80	1.08
IN.	1.25	1.18	1.50	1.16	1.50	1.40	1.86	1.57	1.20	.84	.92	1.20

CAL YR 1980 TOTAL 17450 MEAN 47.7 MAX 95 MIN 32 CFSM 1.23 IN 16.69
WTR YR 1981 TOTAL 16298 MEAN 44.7 MAX 102 MIN 24 CFSM 1.15 IN 15.59

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE¼ sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 25 ft (8 m) upstream from bridge on Lovers Lane, and 3.0 mi (4.8 km) south of Kalamazoo.

DRAINAGE AREA.--22.4 mi² (58.0 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft (248.375 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi (3.2 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 40.3 ft³/s (1.141 m³/s), 24.43 in/yr (621 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) June 26, 1978, gage height, 4.49 ft (1.369 m); minimum, 8.0 ft³/s (0.23 m³/s) Jan. 19, 1965, gage height, 0.88 ft (0.268 m), result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft³/s)	(m³/s)	(ft)	(m)			(ft³/s)	(m³/s)	(ft)	(m)
Apr. 23	0600	164	4.64	3.47	1.058	Aug. 31	0800	*166	4.70	*3.56	1.085
May 10	1600	104	2.95	2.88	0.878	Sept. 21	2400	103	2.92	2.92	0.890
May 30	0200	105	2.97	2.89	0.881	Sept. 27	0100	108	3.06	2.92	0.890
June 13	1100	101	2.86	2.84	0.866	Sept. 30	0700	107	3.03	2.92	0.890

Minimum discharge, 24 ft³/s (0.68 m³/s) Aug. 24, gage height, 1.60 ft (0.488 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	45	44	48	35	38	42	49	43	42	37	31	59
2	46	41	69	35	41	43	44	38	44	38	30	42
3	47	44	52	36	42	44	44	36	42	35	36	42
4	42	47	49	34	40	44	43	38	42	35	33	39
5	37	46	50	37	40	46	37	38	41	35	31	35
6	41	47	48	39	42	42	38	36	37	36	34	34
7	42	47	56	39	42	41	35	37	32	35	36	33
8	42	46	69	40	36	38	35	37	36	36	32	34
9	43	42	57	39	39	40	44	36	43	36	30	34
10	41	44	49	38	43	42	38	75	38	35	32	33
11	40	44	45	36	47	41	42	74	38	34	31	34
12	40	46	44	38	42	43	48	51	36	33	34	32
13	42	48	42	38	41	44	42	45	69	42	32	31
14	44	46	38	38	40	41	55	48	65	35	32	34
15	44	44	40	40	40	39	44	45	51	34	35	33
16	46	43	40	39	53	40	44	40	53	34	30	33
17	55	45	41	37	60	41	42	37	43	34	31	36
18	46	44	39	36	70	41	38	37	39	31	31	35
19	43	45	38	37	74	41	41	37	40	31	31	32
20	44	44	36	39	67	42	40	37	37	34	31	32
21	45	44	34	40	60	41	38	36	38	34	29	44
22	43	40	37	41	56	37	43	35	53	33	27	56
23	43	40	38	40	61	41	106	33	42	32	26	36
24	49	46	37	39	58	42	54	51	41	31	28	35
25	52	44	33	37	52	40	45	49	40	30	29	37
26	47	44	34	42	49	51	41	45	38	31	32	40
27	45	41	32	42	48	45	41	40	36	32	51	75
28	45	47	32	42	48	42	53	38	34	51	43	45
29	45	45	39	41	---	40	62	40	36	36	34	41
30	45	42	39	42	---	47	47	71	37	34	32	92
31	45	---	40	39	---	45	---	44	---	34	118	---
TOTAL	1374	1330	1345	1195	1369	1306	1373	1347	1263	1078	1092	1218
MEAN	44.3	44.3	43.4	38.5	48.9	42.1	45.8	43.5	42.1	34.8	35.2	40.6
MAX	55	48	69	42	74	51	106	75	69	51	118	92
MIN	37	40	32	34	36	37	35	33	32	30	26	31

CAL YR 1980 TOTAL 16157 MEAN 44.1 MAX 98 MIN 28
WTR YR 1981 TOTAL 15290 MEAN 41.9 MAX 118 MIN 26

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE¼ sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi (3.4 km) southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft (264.829 m) Kalamazoo County Road Commission datum.

REMARKS.--Records good except those for period of no gage-height record, Dec. 21 to Feb. 24, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 7.58 ft³/s (0.215 m³/s), 7.92 in/yr (201 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft³/s (0.74 m³/s) Aug. 31, 1975, gage height, 2.15 ft (0.655 m); minimum, 1.9 ft³/s (0.054 m³/s) July 16, 17, 18, 22, 23, 24, 25, 1981, gage height, 1.06 ft (0.323 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10 ft³/s (0.28 m³/s) Apr. 24, maximum gage height, 1.53 ft (0.466 m) Dec. 9, Apr. 24, Sept. 1; minimum discharge, 1.9 ft³/s (0.054 m³/s) July 16, 17, 18, 22, 23, 24, 25, gage height, 1.06 ft (0.323 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.0	4.0	5.7	4.6	5.0	5.7	5.9	8.0	5.0	2.8	3.0	9.6
2	4.0	4.0	6.6	4.6	5.0	5.3	5.3	7.7	4.8	2.8	2.8	8.9
3	4.0	4.0	6.6	4.7	5.0	5.3	5.2	7.1	4.7	2.7	3.0	7.8
4	4.0	4.3	6.4	4.7	5.0	5.3	5.5	6.6	4.2	2.7	2.8	6.8
5	4.0	4.3	6.2	4.7	5.0	5.2	5.3	6.2	4.0	2.5	2.7	5.5
6	3.7	4.3	6.8	4.7	5.0	5.2	5.2	5.7	3.7	2.5	2.7	4.8
7	3.7	4.5	8.4	4.8	5.0	5.0	4.8	5.3	3.4	2.5	3.1	4.3
8	3.7	4.3	9.1	4.8	5.0	5.0	4.8	5.2	3.4	2.4	3.1	4.2
9	3.6	4.5	9.6	4.9	5.0	5.0	5.2	5.0	3.7	2.4	3.0	3.7
10	3.6	4.3	9.3	4.9	5.0	5.0	5.3	6.4	3.8	2.1	2.8	3.4
11	3.6	4.2	8.4	4.9	5.0	5.0	5.9	9.3	3.7	2.1	2.7	3.3
12	3.6	4.2	7.8	5.0	5.0	5.0	6.4	9.3	3.6	2.1	2.7	3.1
13	3.6	4.0	6.9	5.0	5.0	5.0	6.4	8.2	5.2	2.2	2.5	3.0
14	3.4	4.2	6.4	5.0	5.4	5.0	6.9	7.5	6.8	2.1	2.5	2.8
15	3.4	4.2	6.2	5.0	6.0	5.2	6.8	7.3	7.3	2.1	2.8	2.7
16	3.7	4.2	5.9	5.0	6.6	5.0	6.0	6.6	7.1	2.0	2.7	2.5
17	4.5	4.2	5.7	5.1	7.4	5.0	5.9	6.0	6.0	2.0	2.5	2.7
18	4.8	4.2	5.5	5.1	8.2	5.0	5.3	5.7	5.3	2.0	2.5	3.0
19	4.7	4.2	5.5	5.1	9.0	5.0	5.3	5.3	4.8	2.1	2.4	3.0
20	4.3	4.2	5.3	5.1	9.3	5.2	5.2	5.2	4.3	2.1	2.4	3.0
21	4.0	4.2	5.2	5.1	9.0	5.0	5.0	4.8	4.0	2.1	2.5	3.3
22	3.8	4.2	5.0	5.1	8.5	5.0	5.2	4.7	4.7	2.0	2.4	5.5
23	3.4	4.2	4.8	5.1	8.2	5.0	9.5	4.7	4.5	2.0	2.4	5.9
24	3.6	4.5	4.8	5.1	7.8	5.0	10	4.8	4.5	2.0	2.3	5.7
25	4.5	4.8	4.7	5.1	6.9	4.8	9.1	5.2	4.2	2.0	2.1	5.3
26	4.7	4.7	4.7	5.1	6.4	5.5	7.8	5.5	3.8	2.1	2.1	5.3
27	4.7	5.0	4.6	5.1	5.9	6.2	6.9	5.5	3.4	2.1	2.8	6.6
28	4.7	5.2	4.6	5.1	5.9	6.4	6.8	5.3	3.3	3.0	3.3	6.0
29	4.5	5.5	4.5	5.1	---	6.2	7.8	5.2	3.1	3.3	3.6	5.7
30	4.5	5.5	4.5	5.1	---	6.2	8.2	5.5	3.0	3.3	4.0	7.8
31	4.2	---	4.6	5.1	---	6.0	---	5.5	---	3.3	8.2	---
TOTAL	124.5	132.1	190.3	153.8	175.5	163.7	188.9	190.3	133.3	73.4	90.4	145.2
MEAN	4.02	4.40	6.14	4.96	6.27	5.28	6.30	6.14	4.44	2.37	2.92	4.84
MAX	4.8	5.5	9.6	5.1	9.3	6.4	10	9.3	7.3	3.3	8.2	9.6
MIN	3.4	4.0	4.5	4.6	5.0	4.8	4.8	4.7	3.0	2.0	2.1	2.5
CFSM	.31	.34	.47	.38	.48	.41	.49	.47	.34	.18	.23	.37
IN.	.36	.38	.54	.44	.50	.47	.54	.54	.38	.21	.26	.42

CAL YR 1980 TOTAL 2216.7 MEAN 6.06 MAX 12 MIN 3.4 CFSM .47 IN 6.34
WTR YR 1981 TOTAL 1761.4 MEAN 4.83 MAX 10 MIN 2.0 CFSM .37 IN 5.04

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE¼ sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft (9 m) upstream from culvert on Oakland Drive, 2.5 mi (4.0 km) upstream from mouth, and 3.7 mi (6.0 km) southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi² (48.4 km²).

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft (261.546 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. At times flow is affected by ground-water withdrawals. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 9.95 ft³/s (0.282 m³/s), 7.23 in/yr (184 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft³/s (1.16 m³/s) Apr. 19, 1975, gage height, 3.32 ft (1.012 m); minimum, 1.0 ft³/s (0.028 m³/s) Aug. 9, 1964; minimum gage height, 0.88 ft (0.268 m) July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 20 ft³/s (0.57 m³/s) Apr. 23, gage height, 2.83 ft (0.863 m); minimum daily, 3.7 ft³/s (0.10 m³/s) July 18, 19, Aug. 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.6	8.2	9.1	7.2	8.2	10	8.7	11	10	6.0	5.8	15
2	7.5	7.9	12	7.2	8.2	9.7	8.0	11	9.7	5.8	5.7	14
3	7.5	7.8	12	7.2	8.2	9.2	7.8	10	9.2	5.6	5.6	13
4	7.5	8.1	11	7.2	8.2	8.9	7.8	9.8	8.8	5.4	5.5	12
5	7.4	8.1	11	7.2	8.2	8.8	7.9	9.5	8.4	5.3	5.4	11
6	7.3	7.8	11	7.3	8.2	8.6	7.7	9.2	7.7	5.1	5.4	9.6
7	7.2	7.8	12	7.3	8.2	8.2	7.4	8.7	7.1	4.9	5.6	8.6
8	7.0	7.8	15	7.4	8.2	8.1	7.3	8.3	6.8	4.9	6.0	8.0
9	7.0	7.9	16	7.4	8.2	8.1	8.2	8.1	7.1	4.9	5.8	7.3
10	7.0	7.8	15	7.5	8.2	8.1	7.9	11	7.3	4.8	5.6	6.8
11	7.0	7.9	14	7.6	8.2	8.1	8.6	17	6.9	4.5	5.2	6.3
12	7.0	8.1	13	7.7	8.2	8.1	9.8	16	6.5	4.3	5.1	5.9
13	7.0	8.4	11	7.8	8.2	8.1	10	14	9.1	4.6	5.0	5.5
14	7.0	8.6	11	7.8	8.8	8.1	12	13	12	4.5	4.8	5.4
15	7.0	8.6	9.7	7.8	10	8.1	11	13	11	4.1	5.0	5.2
16	7.4	8.6	9.1	7.9	10	7.8	10	11	11	4.1	5.0	5.0
17	8.5	8.6	8.7	7.9	12	7.9	9.3	10	11	3.9	4.8	5.0
18	9.3	8.6	8.2	8.0	14	7.9	9.0	9.8	10	3.7	4.8	5.4
19	9.0	8.4	8.0	8.0	16	8.0	8.3	9.2	9.4	3.7	4.5	5.4
20	8.7	8.1	7.8	8.0	16	8.1	8.0	8.6	8.8	4.1	4.1	5.3
21	8.4	8.1	7.6	8.1	15	8.0	7.5	8.1	8.3	4.0	4.0	6.2
22	8.1	7.8	7.5	8.2	14	8.0	7.4	8.1	9.4	3.9	3.9	12
23	7.7	7.9	7.4	8.2	14	7.8	19	7.8	9.0	3.8	3.9	11
24	7.7	8.1	7.3	8.2	14	7.7	17	7.8	8.4	3.8	3.9	9.3
25	8.6	8.1	7.2	8.2	13	7.3	15	8.4	8.2	3.8	3.7	8.6
26	8.9	8.1	7.2	8.2	12	7.4	13	8.6	7.5	3.9	3.7	9.2
27	8.7	8.2	7.1	8.2	11	8.1	12	8.4	6.9	4.3	4.7	13
28	8.8	8.7	7.0	8.2	11	8.1	11	8.2	6.7	5.0	5.5	10
29	8.5	8.9	7.0	8.2	---	8.1	12	8.2	6.3	6.0	5.6	10
30	8.4	8.9	7.0	8.2	---	8.6	12	9.7	6.0	6.4	6.3	16
31	8.4	---	7.0	8.2	---	8.6	---	10	---	6.2	14	---
TOTAL	243.1	245.9	303.9	241.5	297.4	255.6	300.6	311.5	254.5	145.3	163.9	265.0
MEAN	7.84	8.20	9.80	7.79	10.6	8.25	10.0	10.0	8.48	4.69	5.29	8.83
MAX	9.3	8.9	16	8.2	16	10	19	17	12	6.4	14	16
MIN	7.0	7.8	7.0	7.2	8.2	7.3	7.3	7.8	6.0	3.7	3.7	5.0
CFSM	.42	.44	.52	.42	.57	.44	.54	.54	.45	.25	.28	.47
IN.	.48	.49	.60	.48	.59	.51	.60	.62	.51	.29	.33	.53

CAL YR 1980 TOTAL 3768.5 MEAN 10.3 MAX 19 MIN 5.1 CFSM .55 IN 7.50
WTR YR 1981 TOTAL 3028.2 MEAN 8.30 MAX 19 MIN 3.7 CFSM .44 IN 6.02

04106500 PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°16'27", long 85°34'35", in NW¼ NE¼ sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft (15 m) upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 miles (2.4 km) upstream from mouth.

DRAINAGE AREA.--46.8 mi² (121.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to September 1958, June 1975 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft (232.105 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 5.0 mi (8.0 km) upstream from station.

AVERAGE DISCHARGE.-17 years (water years 1948-58, 1976-81), 54.3 ft³/s (1.538 m³/s), 15.76 in/yr (400 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 580 ft³/s (16.4 m³/s) sometime in July 1954 from rating curve extended above 165 ft³/s (4.67 m³/s), gage height, 5.25 ft (1.600 m) caused by momentary gate opening of millpond; maximum gage height, 5.44 ft (1.658 m) June 26, 1978; minimum discharge, 2.0 ft³/s (0.057 m³/s) May 8, 1956, gage height, 1.50 ft (0.457 m); minimum gage height, 1.41 ft (0.430 m) May 12, 13, 1980, Aug. 16, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 206 ft³/s (5.83 m³/s) Aug. 31, gage height, 3.93 ft (1.198 m); minimum, 2.8 ft³/s (0.079 m³/s) Aug. 16, gage height, 1.41 ft (0.430 m); minimum daily, 27 ft³/s (0.76 m³/s) Aug. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	50	56	50	50	57	57	58	53	41	32	108
2	55	47	85	48	50	55	51	54	54	42	31	59
3	56	46	62	48	50	57	50	50	52	41	38	53
4	52	52	57	46	50	56	50	50	52	40	34	53
5	46	49	59	47	50	57	44	51	50	40	32	45
6	48	50	59	50	51	54	44	48	47	40	31	43
7	50	50	73	50	53	51	42	47	40	39	39	42
8	50	49	83	49	48	49	42	48	43	38	36	43
9	50	47	78	49	48	49	57	47	51	35	31	42
10	47	46	64	49	53	51	46	96	47	38	32	40
11	48	47	58	47	58	51	61	119	46	34	31	40
12	47	50	56	47	51	53	62	72	45	32	35	38
13	48	52	55	49	50	53	52	62	95	42	32	36
14	49	53	51	48	51	53	68	67	90	36	33	39
15	49	50	50	50	53	50	54	63	64	34	38	39
16	53	49	51	49	67	49	53	56	71	34	32	37
17	66	50	50	48	78	51	51	52	54	33	31	42
18	56	49	53	36	86	49	48	51	50	30	31	41
19	50	49	48	69	94	50	51	50	48	30	30	39
20	49	50	45	47	90	50	51	48	47	33	31	36
21	51	50	45	48	82	49	46	47	49	33	30	51
22	49	46	45	49	74	46	53	45	66	32	28	99
23	49	46	48	48	76	47	153	43	49	31	27	45
24	54	51	47	49	75	49	87	63	50	28	28	42
25	60	49	45	47	71	46	61	67	47	28	29	44
26	53	50	45	50	63	62	57	59	45	29	31	52
27	51	49	44	50	62	52	55	52	43	29	57	103
28	53	53	44	50	62	49	65	50	41	55	51	58
29	52	55	49	49	---	47	84	51	41	40	39	49
30	50	52	50	49	---	42	63	85	41	33	40	120
31	50	---	53	50	---	66	---	56	---	33	146	---
TOTAL	1594	1486	1708	1515	1746	1600	1758	1807	1571	1103	1166	1578
MEAN	51.4	49.5	55.1	48.9	62.4	51.6	58.6	58.3	52.4	35.6	37.6	52.6
MAX	66	55	85	69	94	66	153	119	95	55	146	120
MIN	46	46	44	36	48	42	42	43	40	28	27	36

CAL YR 1980 TOTAL 20240 MEAN 55.3 MAX 126 MIN 33
WTR YR 1981 TOTAL 18632 MEAN 51.0 MAX 153 MIN 27

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: April 1972 to August 1974, August 1975 to current year.

INSTRUMENTATION.--Temperature recorder April 1972 to August 1974, August 1975 to current year.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 33.5 Aug. 21, 23-26, 30, 31, Sept. 4-6, 8-13, 15, 1981, minimum, 0.0ºC Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 33.5 Aug. 21, 23-26, 30, 31, Sept. 4-6, 8-13, 15, minimum 1.0ºC Dec. 31.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	17.5	17.5	12.5	10.5	11.5	10.5	8.0	9.0	5.0	3.0	4.0
2	19.0	16.5	18.0	12.0	9.5	10.5	8.5	5.5	7.5	5.0	3.5	4.5
3	17.0	13.5	15.0	14.5	9.5	11.5	7.0	4.5	5.5	7.0	1.5	3.0
4	13.5	12.0	12.5	13.5	12.0	13.0	8.5	6.0	7.0	3.5	1.5	2.5
5	14.0	12.0	13.0	12.5	11.0	12.0	10.0	8.0	9.0	3.5	2.0	2.5
6	14.0	12.0	13.0	12.5	10.5	12.0	15.5	8.5	12.5	4.0	2.5	3.5
7	16.0	12.5	14.0	16.0	12.5	14.0	15.5	13.0	14.5	4.5	2.0	3.0
8	17.5	14.0	15.5	15.5	12.0	13.0	15.0	10.0	13.0	6.5	3.0	4.5
9	17.5	14.5	16.0	16.0	11.5	13.0	12.5	8.5	11.0	6.5	3.0	4.5
10	16.0	13.5	15.0	15.0	12.0	13.0	12.5	6.0	9.0	5.5	3.0	4.5
11	15.5	12.5	14.0	12.5	10.0	11.5	7.0	4.5	6.0	6.0	3.5	5.0
12	13.5	12.0	12.5	12.0	9.5	11.0	10.0	5.0	7.0	6.5	3.5	4.5
13	15.0	11.5	13.0	16.0	9.5	12.5	8.0	3.5	5.5	8.0	5.0	6.5
14	14.5	12.0	13.0	16.0	14.0	15.0	7.0	3.5	5.5	8.0	7.0	7.0
15	20.5	12.5	16.0	15.5	11.0	11.5	6.5	4.5	6.0	10.5	6.0	7.5
16	19.0	15.5	17.0	16.0	11.0	12.5	6.5	3.5	5.0	8.0	6.0	7.0
17	19.0	16.0	17.5	15.0	11.0	13.0	6.5	3.5	4.5	9.5	6.5	7.5
18	16.0	14.0	15.0	13.5	11.0	12.0	9.0	5.0	7.0	10.0	5.5	8.0
19	15.0	13.0	13.5	12.5	9.0	10.5	7.0	2.0	4.0	11.0	5.5	8.0
20	14.0	12.0	13.0	13.0	8.5	11.0	5.0	2.0	4.0	12.0	7.5	9.5
21	14.5	11.5	13.0	12.5	9.0	11.0	6.5	2.5	5.0	11.0	7.0	8.0
22	13.5	11.5	12.5	12.0	7.5	10.0	6.5	5.0	6.0	10.0	7.0	8.5
23	14.0	11.5	12.5	11.5	9.0	10.0	8.0	6.5	7.0	10.5	6.0	8.5
24	15.0	12.5	13.5	11.5	9.0	10.0	8.5	3.5	7.0	11.0	7.5	9.0
25	14.0	10.0	12.0	12.0	8.5	9.5	6.5	2.5	4.5	11.0	7.5	10.0
26	10.0	9.0	9.5	10.0	8.5	9.0	3.5	2.0	2.5	11.0	6.5	8.5
27	9.5	9.0	9.5	9.5	6.5	8.0	6.0	3.5	4.5	10.5	6.5	8.0
28	13.0	9.0	10.5	12.0	6.5	9.0	5.5	3.5	4.0	11.0	8.5	9.5
29	13.0	9.5	11.0	10.0	7.5	8.5	5.0	2.0	4.0	13.0	9.0	11.0
30	10.5	8.5	9.5	13.5	8.5	10.5	6.5	2.5	5.0	11.5	5.5	8.5
31	12.0	9.5	10.5	---	---	---	5.0	1.0	2.5	12.5	6.5	8.0
MONTH	20.5	8.5	13.5	16.0	6.5	11.5	15.5	1.0	6.5	13.0	1.5	6.5

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	8.5	6.5	7.0	22.0	10.0	15.0	16.0	9.5	12.5	19.5	13.5	16.0
2	10.5	6.5	7.0	25.5	7.5	17.5	16.5	13.5	15.0	22.5	15.0	19.5
3	16.0	3.0	8.5	22.5	12.0	17.5	20.5	14.0	16.0	24.0	17.0	21.0
4	9.0	3.5	7.0	32.5	13.5	20.0	21.0	11.5	14.5	25.0	20.0	22.5
5	10.0	4.5	7.5	27.5	11.5	20.0	12.5	8.5	10.0	24.0	18.0	21.5
6	7.5	4.5	5.5	27.0	16.0	20.5	15.0	10.5	12.5	23.5	17.0	20.0
7	8.0	5.5	6.5	24.5	13.5	19.0	17.5	12.5	15.0	24.0	16.0	20.0
8	9.5	4.5	6.5	21.0	9.0	15.5	17.5	14.0	15.0	23.5	17.0	20.5
9	6.0	3.0	4.5	19.0	9.0	13.5	17.5	14.0	16.0	26.0	21.0	23.5
10	10.5	3.0	5.5	12.5	7.0	10.5	17.5	14.0	15.5	23.0	14.0	17.5
11	10.0	2.0	6.0	16.5	8.0	13.0	17.5	14.0	16.0	15.5	12.0	13.5
12	9.0	2.0	5.0	15.5	12.0	13.5	16.0	12.5	14.0	20.5	11.0	15.5
13	7.0	3.5	5.0	15.5	11.0	13.0	18.5	14.5	16.0	24.5	16.0	20.0
14	9.5	3.5	6.5	19.5	11.0	15.0	21.0	14.0	17.0	23.0	14.5	18.0
15	8.0	5.0	6.0	19.5	11.0	15.5	21.0	17.0	19.0	15.5	11.0	13.0
16	9.0	6.0	7.5	20.5	9.5	17.0	24.0	19.5	21.0	18.0	11.5	15.0
17	11.0	7.0	8.5	18.5	13.5	16.0	27.0	18.0	23.5	18.5	15.0	16.5
18	9.0	7.5	8.5	18.5	9.5	12.5	26.0	20.0	22.0	18.5	13.0	16.0
19	9.0	6.5	7.0	12.5	7.0	9.0	24.5	15.0	19.0	18.0	13.5	16.0
20	9.0	7.0	8.0	14.5	7.0	9.5	24.5	15.0	20.5	21.5	14.0	16.5
21	9.0	6.5	8.0	13.5	7.0	11.0	20.0	16.0	18.0	20.5	15.0	18.0
22	9.5	6.5	8.0	15.0	8.0	11.5	20.5	15.0	17.0	22.0	16.0	19.0
23	12.0	7.0	8.5	21.5	13.0	16.0	18.0	13.0	16.0	25.0	17.5	21.5
24	14.0	7.0	11.5	22.5	14.0	18.0	17.5	12.5	15.5	24.5	17.0	20.5
25	15.5	9.5	13.5	22.5	12.0	15.0	17.0	14.0	15.5	24.5	20.0	22.0
26	13.0	9.5	11.5	16.0	11.0	13.5	18.5	13.0	16.0	22.0	18.0	20.0
27	13.0	9.5	11.5	17.0	13.0	15.0	23.5	16.5	21.0	21.0	17.5	19.5
28	12.0	9.0	10.5	16.5	14.0	15.5	25.5	20.0	22.5	21.5	17.0	19.5
29	---	---	---	15.5	11.5	14.0	20.5	14.0	17.5	21.5	18.0	19.5
30	---	---	---	17.0	11.5	14.0	22.0	13.5	19.0	21.0	17.0	18.5
31	---	---	---	18.5	13.0	15.5	---	---	---	22.0	16.5	19.0
MONTH	16.0	2.0	7.5	32.5	7.0	15.0	27.0	8.5	17.0	26.0	11.0	18.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	23.0	17.5	19.5	25.0	19.5	23.0	26.5	20.5	23.5	32.5	30.0	17.0
2	22.5	17.5	20.0	24.0	19.0	22.0	27.0	23.5	24.5	32.5	28.5	26.0
3	24.5	17.5	21.5	24.5	19.0	22.0	25.0	22.5	24.0	31.0	29.5	30.5
4	23.0	18.0	20.0	24.0	20.0	22.0	26.5	20.5	23.5	33.5	30.0	21.0
5	22.0	18.5	20.5	26.5	21.0	24.0	26.0	20.5	24.0	33.5	31.5	15.0
6	25.0	20.5	22.0	27.0	21.0	23.5	26.5	21.0	24.0	33.5	30.5	21.0
7	27.5	18.0	22.5	27.5	23.5	25.5	25.0	22.0	24.0	33.0	32.5	2.5
8	25.0	20.0	22.5	26.0	22.0	24.0	27.0	20.5	23.5	33.5	32.5	15.0
9	24.0	19.5	21.0	29.0	24.0	26.0	24.5	21.0	23.0	33.5	29.5	30.0
10	24.0	16.5	20.5	28.5	24.5	26.0	25.5	22.5	24.0	32.5	29.5	15.5
11	26.5	20.5	22.5	29.0	22.0	26.0	27.5	20.5	24.5	33.5	32.0	5.5
12	24.5	20.5	22.5	27.5	21.5	24.5	28.5	21.5	24.0	33.5	32.0	12.5
13	25.0	18.5	22.5	29.5	23.0	26.0	25.5	21.5	24.0	33.5	31.0	15.0
14	25.0	18.5	22.5	26.5	21.5	24.0	25.5	22.0	24.0	---	---	---
15	25.0	20.0	23.5	26.0	22.5	24.0	24.5	21.0	23.0	33.5	29.0	28.0
16	23.5	20.5	22.0	25.0	21.5	23.5	24.5	20.5	22.0	33.0	24.5	26.0
17	24.0	18.0	21.0	25.5	21.0	23.5	24.5	20.5	22.5	30.0	25.0	27.0
18	25.0	20.5	22.5	25.0	21.0	23.0	26.5	22.0	24.0	31.5	24.5	28.0
19	25.0	20.5	23.5	26.0	22.0	24.0	27.5	19.5	23.5	29.0	21.5	25.5
20	25.0	21.0	23.5	27.0	22.5	25.0	33.0	19.0	20.5	28.0	24.0	26.5
21	25.5	21.5	23.5	26.0	21.0	24.0	33.5	29.5	27.5	26.5	21.5	24.0
22	24.5	20.5	22.0	27.0	21.5	24.0	33.0	31.0	13.5	26.0	21.0	23.0
23	27.0	19.0	22.5	25.5	21.0	23.5	33.5	31.0	21.5	27.5	21.0	24.0
24	25.0	21.0	23.0	29.5	23.5	25.5	33.5	31.5	15.0	26.5	21.0	22.5
25	25.5	21.5	23.5	27.0	20.0	24.5	33.5	32.5	4.0	19.5	17.0	18.0
26	25.0	21.0	23.0	27.0	24.0	25.5	33.5	29.0	23.5	22.0	17.0	19.5
27	24.0	18.0	21.0	26.5	21.5	24.0	33.0	30.5	31.5	22.5	18.5	21.0
28	23.0	17.5	20.5	22.5	17.5	20.5	33.0	30.0	21.0	19.0	15.5	17.0
29	26.0	19.5	22.5	25.0	16.5	20.5	33.0	32.0	13.5	19.5	16.0	17.5
30	25.5	21.5	24.0	24.5	17.5	21.0	33.5	32.5	7.0	20.0	14.5	16.5
31	---	---	---	26.5	20.5	22.5	33.5	32.0	15.0	---	---	---
MONTH	27.5	16.5	22.0	29.5	16.5	24.0	33.5	19.0	21.5	33.5	14.5	20.5

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE¼ sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft (12 m) upstream from bridge on State Highway 89, 2.1 mi (3.4 km) downstream from Swan Creek, 4.0 mi (6.4 km) downstream from Calkins Dam, and 6.1 mi (9.8 km) east of Fennville.

DRAINAGE AREA.--1,600 mi² (4,144 km²), approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam, near Allegan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft (178.768 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi (6.4 km) upstream at NGVD (levels by city of Allegan).

REMARKS.--Records good. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936, by Calkins Dam and powerplant, 4.0 mi (6.4 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--51 years, 1,403 ft³/s (39.73 m³/s), 11.91 in/yr (303 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft³/s (496 m³/s) Apr. 11, 1947, gage height, 606.76 ft (184.940 m), site and datum then in use; minimum daily, 50 ft³/s (1.42 m³/s) Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,870 ft³/s (138 m³/s) May 12, gage height, 12.32 ft (3.755 m); minimum, 495 ft³/s (14.0 m³/s) Aug. 17, gage height, 5.32 ft (1.622 m); minimum daily, 706 ft³/s (20.0 m³/s) July 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1600	1480	1260	1710	1220	3150	1790	2720	1500	1250	1470	1840
2	1260	1480	1480	1210	1220	2630	1670	2550	1500	1190	1820	1830
3	1200	1470	1820	1210	1220	2750	1700	2320	1830	1220	1450	1810
4	1580	1480	1830	1300	1230	2360	1710	2300	1920	1210	1070	1770
5	1440	1430	1810	1260	1220	2310	1790	2290	1920	1210	1050	1710
6	802	1220	1800	1250	1220	2300	1250	2280	1910	1210	1420	1700
7	1210	1220	1910	1260	1210	2280	1290	2260	1540	1210	1660	1210
8	1490	1300	2520	1250	1210	2250	1710	2100	1120	1610	1070	1270
9	960	1340	3000	1540	1210	2000	1750	1870	1560	1690	1080	1690
10	1170	1280	2940	1720	1250	1800	1700	1780	1910	1040	1120	1180
11	1260	1500	2830	1250	1520	1340	1810	2600	1900	864	1150	1050
12	1370	1310	2540	1250	1380	1380	2600	4320	1530	869	1530	987
13	1490	1060	2730	1250	1340	1900	2550	3390	1250	936	1460	1300
14	1110	1190	2540	1130	1260	1830	2710	3020	1570	966	948	1470
15	1010	1200	2340	1220	1560	1620	2660	2720	2070	967	952	1080
16	1140	1200	2310	1240	1830	1480	2940	2570	2570	990	1060	1150
17	1570	1190	2130	1230	2110	1830	2720	2750	2380	1000	932	962
18	1660	1200	1850	1230	2470	1340	2680	2600	2210	1030	1170	1030
19	1560	1200	1810	1520	3210	1290	2690	2360	2370	1060	902	1080
20	1220	1190	1710	1560	4420	1840	2560	2340	2110	1050	876	1010
21	1400	1190	1340	1010	3870	1840	2310	2320	1990	1030	762	1220
22	1630	1190	1020	1200	3830	1280	2200	2050	1980	949	959	1460
23	1100	1190	1250	1450	4150	1140	2530	1810	2030	816	966	1230
24	1260	1210	1260	1220	4670	1700	3180	1480	2310	706	879	1490
25	1650	1200	1610	1200	4480	1360	2830	1480	2040	729	903	1330
26	1730	1200	1680	1480	4210	1470	2900	1880	1630	756	864	1430
27	1270	1210	1060	1200	3710	1790	2610	1950	1610	769	1250	1400
28	1490	1200	952	1190	3480	1600	2680	1940	1600	1320	1450	1770
29	1490	1320	1240	1470	---	1240	2880	1890	1360	1740	1330	1940
30	1410	1440	1230	1480	---	1430	2750	1910	1100	1390	787	1770
31	1270	---	1680	1200	---	1660	---	1890	---	1050	1340	---
TOTAL	41802	38290	57482	40690	65710	56190	69150	71740	54320	33827	35680	42169
MEAN	1348	1276	1854	1313	2347	1813	2305	2314	1811	1091	1151	1406
MAX	1730	1500	3000	1720	4670	3150	3180	4320	2570	1740	1820	1940
MIN	802	1060	952	1010	1210	1140	1250	1480	1100	706	762	962
CFSM	.84	.80	1.16	.82	1.47	1.13	1.44	1.45	1.13	.68	.72	.88
IN.	.97	.89	1.34	.95	1.53	1.31	1.61	1.67	1.26	.79	.83	.98

CAL YR 1980 TOTAL 646675 MEAN 1767 MAX 4030 MIN 683 CFSM 1.10 IN 15.04
WTR YR 1981 TOTAL 607050 MEAN 1663 MAX 4670 MIN 706 CFSM 1.04 IN 14.11

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE¼ sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi (4.0 km) northeast of Hopkins.

DRAINAGE AREA.--71.4 mi² (184.9 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 56.9 ft³/s (1.611 m³/s), 10.82 in/yr (275 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft³/s (33.4 m³/s) June 26, 1978, gage height, 9.56 ft (2.914 m); minimum not determined; minimum daily, 9.2 ft³/s (0.26 m³/s) Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.89 ft (0.576 m) Aug. 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 9	1100	311	8.81	7.09	2.161
Feb. 19	0300	642	18.2	8.28	2.524
Apr. 11	1700	429	12.1	7.68	2.341
Apr. 14	1700	353	10.0	7.36	2.243
May 11	1400	*971	27.5	*8.83	2.691

Minimum discharge, 19 ft³/s (0.54 m³/s) Aug. 26, gage height, 2.17 ft (0.661 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	36	48	33	35	108	49	69	48	39	28	26
2	30	34	83	33	35	84	43	62	46	37	27	25
3	31	34	78	33	35	70	41	56	78	36	27	25
4	30	43	68	32	35	66	74	52	87	34	27	25
5	29	49	51	31	35	63	66	49	64	33	27	24
6	29	43	64	30	35	58	52	47	53	32	27	24
7	28	40	169	30	35	52	46	44	47	31	26	24
8	28	40	272	30	35	50	43	42	45	29	25	24
9	27	40	305	30	35	49	51	41	48	28	24	24
10	27	38	208	30	35	49	50	78	46	28	24	23
11	27	36	108	30	35	48	329	695	42	27	23	22
12	27	35	78	30	35	47	336	594	40	27	23	22
13	27	35	70	30	37	46	241	351	112	33	22	21
14	27	34	60	30	40	44	306	262	228	33	22	21
15	32	34	51	30	44	44	311	200	247	30	23	21
16	35	34	48	30	48	43	189	150	161	29	24	24
17	51	33	45	30	80	42	109	110	96	28	22	43
18	67	34	42	30	432	40	86	84	74	27	22	42
19	53	33	39	30	546	38	82	76	62	26	21	37
20	45	32	37	31	387	39	100	69	55	27	21	32
21	40	31	35	31	272	38	79	64	56	28	20	31
22	37	31	34	32	180	38	72	59	59	29	20	35
23	35	31	34	32	167	38	241	56	54	28	20	33
24	34	32	33	33	153	37	219	56	48	26	19	31
25	43	33	32	34	122	37	137	70	46	25	19	30
26	50	32	30	35	99	45	96	96	43	26	19	36
27	48	32	30	35	83	64	80	80	41	28	21	54
28	43	32	30	35	114	51	74	67	39	34	24	50
29	40	35	30	35	---	46	91	60	37	42	26	40
30	37	37	31	35	---	50	82	58	39	36	32	73
31	36	---	32	35	---	59	---	53	---	31	28	---
TOTAL	1124	1063	2275	985	3224	1583	3775	3850	2141	947	733	942
MEAN	36.3	35.4	73.4	31.8	115	51.1	126	124	71.4	30.5	23.6	31.4
MAX	67	49	305	35	546	108	336	695	247	42	32	73
MIN	27	31	30	30	35	37	41	41	37	25	19	21
CFSM	.51	.50	1.03	.45	1.61	.72	1.77	1.74	1.00	.43	.33	.44
IN.	.59	.55	1.19	.51	1.68	.82	1.97	2.01	1.12	.49	.38	.49

CAL YR 1980 TOTAL 21502 MEAN 58.7 MAX 380 MIN 27 CFSM .82 IN 11.20
WTR YR 1981 TOTAL 22642 MEAN 62.0 MAX 695 MIN 19 CFSM .87 IN 11.80

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE¼ sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi (12.7 km) downstream from Rabbit River, 17.6 mi (28.3 km) downstream from gaging station near Fennville and 2.9 mi (4.7 km) upstream from mouth.

DRAINAGE AREA.--2,020 mi² (5,230 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981 (discontinued).
WATER TEMPERATURES: May 1975 to September 1981 (discontinued).

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981 (discontinued).

REMARKS.--In addition to water-quality monitor, water temperature readings and specific conductance samples were collected by a local observer on an approximate twice-weekly basis. Interruptions in the daily record were due to malfunctions of the instrument. Water-discharge measurement made at time of sampling.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and were analyzed by U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1974-75, 1979-81), 747 micromhos Apr. 30, 1980; minimum recorded (water years 1974-75, 1978-79, 1981), 172 micromhos Sept. 18, 1978.
WATER TEMPERATURES: Maximum recorded (water years 1975, 1977-81), 31.5°C July 20, 1977; minimum (water years 1975, 1978-81), 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 726 micromhos May 9; minimum, 324 micromhos May 12.
WATER TEMPERATURES: Maximum, 29.5°C July 8; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
NOV												
04...	1130	2050	610	7.4	8.0	10.8	95	K13	K3	260	30	71
DEC												
10...	1030	3700	523	7.4	1.5	--	--	540	E8000	230	21	61
JAN												
13...	1130	E1580	653	7.6	.0	10.5	73	300	12	260	29	71
FEB												
18...	1000	E2730	516	7.5	.5	12.5	88	--	--	190	0	55
MAR												
24...	1200	1530	597	8.1	7.0	12.6	105	--	--	270	40	73
APR												
21...	1100	2650	449	7.9	15.0	12.5	125	--	--	220	0	61
MAY												
19...	1400	3180	442	7.5	16.0	11.6	118	K44	K10	220	15	60
JUN												
23...	0900	2330	475	7.9	23.5	9.0	106	--	--	240	27	65
JUL												
28...	1200	701	610	8.1	21.0	8.9	99	--	750	260	47	67
SEP												
02...	1215	1900	520	8.2	22.0	8.7	100	--	630	230	25	58
29...	1200	1990	545	8.2	13.5	9.8	97	--	--	260	30	68

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
NOV											
04...	20	21	15	.6	2.3	1.7	280	0	230	17	45
DEC											
10...	18	16	13	.5	3.0	2.2	250	0	205	13	--
JAN											
13...	21	20	14	.5	2.9	2.2	290	0	238	11	47
FEB											
18...	12	20	19	.6	2.5	1.9	240	0	200	10	37
MAR											
24...	21	18	13	.5	2.2	1.6	280	0	230	3.3	47
APR											
21...	17	12	10	.4	2.2	1.6	280	0	230	4.7	39
MAY											
19...	17	13	11	.4	2.1	1.6	250	0	205	12	37
JUN											
23...	19	17	13	.5	2.0	1.5	260	0	213	4.7	38
JUL											
28...	23	26	18	.7	2.0	1.5	260	0	213	2.9	49
SEP											
02...	20	22	17	.6	1.9	1.4	250	0	205	2.5	37
29...	22	19	14	.6	2.2	--	280	0	230	--	42

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
NOV											
04...	32	.2	7.0	360	341	1990	.96	.96	.150	.150	.21
DEC											
10...	29	.2	7.1	316	--	3160	1.2	1.2	.170	.170	.22
JAN											
13...	33	.2	10	--	348	--	1.2	1.1	.420	.160	.51
FEB											
18...	33	.1	8.0	309	292	--	1.4	1.3	.430	.400	--
MAR											
24...	29	.2	7.6	342	340	1410	.95	.94	.170	.160	--
APR											
21...	22	.2	4.3	297	275	2130	.74	.67	.040	.040	--
MAY											
19...	23	.2	4.2	313	283	2690	.82	.79	.040	.040	--
JUN											
23...	26	.2	8.9	341	308	2150	.90	.91	.080	.090	--
JUL											
28...	38	.2	7.6	390	344	738	.73	.69	.060	.020	--
SEP											
02...	36	.2	--	336	--	1720	.31	.31	.030	--	--
29...	34	.2	4.2	343	321	1840	.64	.64	.030	.030	--

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV											
04...	.85	1.00	2.0	8.7	.090	.28	.040	8.4	12	66	100
DEC											
10...	.53	.70	1.9	8.4	.120	.15	.050	8.5	26	260	100
JAN											
13...	.49	.91	2.1	9.3	.060	.18	.030	--	--	--	--
FEB											
18...	.87	1.30	2.7	12	.180	.55	.060	8.0	--	--	--
MAR											
24...	1.2	1.40	2.4	10	.110	.34	.040	5.5	11	45	100
APR											
21...	.92	.96	1.7	7.5	.110	.34	.030	9.4	14	100	100
MAY											
19...	.74	.78	1.6	7.1	.170	.52	.030	--	--	--	--
JUN											
23...	.91	.99	1.9	8.4	.150	.46	.070	7.2	26	164	100
JUL											
28...	1.3	1.40	2.1	9.4	.140	.43	.040	--	20	38	100
SEP											
02...	1.7	1.70	2.0	8.9	.170	.52	.020	8.4	30	154	100
29...	.70	.73	1.4	6.1	.140	.43	.020	--	40	215	100

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)
JAN											
13...	1130	1	1	--	60	<1	<1	20	10	1	1
MAY											
19...	1400	1	1	100	50	1	<1	--	<10	1	0
JUL											
28...	1200	2	2	100	70	1	<1	<10	<10	3	3
SEP											
29...	1200	4	3	100	20	1	1	20	10	6	3

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)
JAN										
13...	4	0	350	40	6	3	70	60	<.1	<.1
MAY										
19...	8	5	1100	20	8	4	70	20	.1	<.1
JUL										
28...	6	4	610	30	13	2	100	3	.1	<.1
SEP										
29...	6	1	980	11	4	3	100	7	<.1	<.1

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
JAN										
13...	5	4	0	0	2	0	30	5	--	.4
MAY										
19...	79	7	0	0	0	0	50	<4	7.3	.3
JUL										
28...	6	5	0	0	<1	0	30	10	4.8	2.2
SEP										
29...	23	2	<1	<1	<1	<1	20	4	5.7	3.5

DATE	TIME	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)
NOV											
04...	1130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)
NOV										
04...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 4,80		MAR 24,81		MAY 19,81		JUN 23,81	
TIME	1130		1200		1400		0900	
TOTAL CELLS/ML	5200		5800		13000		26000	
DIVERSITY: DIVISION	1.5		1.5		1.4		1.0	
.CLASS	1.5		1.5		1.8		1.0	
..ORDER	1.7		1.6		2.3		1.8	
...FAMILY	1.9		1.8		2.8		2.0	
....GENUS	2.5		2.1		3.3		2.7	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	680	13	--	-	1200	9	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	120	2	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	460	3	700	3
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	460	3	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	200	3	370	3	2800	11
....TETRASTRUM	--	-	--	-	740	6	560	2
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	31	1	1900#	33	550	4	560	2
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	1200#	23	--	-	4800#	36	12000#	44
....MELOSIRA	150	3	550	9	550	4	2200	8
....STEPHANODISCUS	1500#	29	2400#	41	370	3	1100	4
..PENNALES								
...ACHNANTHACEAE								
....COCCONEIS	--	-	--	-	--	-	140	1
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....FRAGILARIA	--	-	--	-	--	-	4100#	15
....SYNEDRA	--	-	--	-	180	1	420	2
...NAVICULACEAE								
....NAVICULA	62	1	150	3	180	1	560	2
...NITZSCHIACEAE								
....NITZSCHIA	93	2	--	-	460	3	--	-
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...DINOBRYACEAE								
....DINOBRYON	--	-	--	-	1400	10	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	1100	8	1100	4
...CRYPTOMONADACEAE								
....CRYPTOMONAS	190	4	150	3	92	1	140	1
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	--	-	420	2
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	1200#	22	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	500	9	370	3	--	-

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 28,81		SEP 2,81		SEP 29,81	
TIME	1200		1215		1200	
TOTAL CELLS/ML	54000		49000		14000	
DIVERSITY: DIVISION	1.7		1.1		1.2	
.CLASS	1.7		1.1		1.3	
..ORDER	1.9		1.5		1.7	
...FAMILY	2.5		2.1		2.1	
....GENUS	2.8		3.2		2.4	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....SCHROEDERIA	290	1	--	-	--	-
....TETRAEDRON	290	1	450	1	120	1
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	--	-	--	-	--	-
...HYDRODICTYACEAE						
....PEDIASTRUM	5200	10	--	-	1900	13
...MICRACTINIACEAE						
....MICRACTINIUM	580	1	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	1200	2	1400	3	120	1
....KIRCHNERIELLA	--	-	1800	4	230	2
....OOCYSTIS	1200	2	--	-	--	-
....SELENASTRUM	860	2	--	-	--	-
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	3600	7	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	4500	9	--	-
....SCENEDESMUS	8600#	16	7700#	16	700	5
....TETRASTRUM	--	-	1800	4	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	1400	3	3200	6	460	3
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	19000#	35	3600	7	8100#	57
....MELOSIRA	2600	5	13000#	27	230	2
....STEPHANODISCUS	--	-	5700	12	460	3
..PENNALES						
...ACHNANTHACEAE						
....COCCONEIS	--	-	--	-	--	-
...CYMBELLACEAE						
....CYMBELLA	--	-	--	-	120	1
...FRAGILARIACEAE						
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	680	1	230	2
...NAVICULACEAE						
....NAVICULA	860	2	680	1	350	2
...NITZSCHIACEAE						
....NITZSCHIA	--	-	--	-	120	1
...DINOBRYACEAE						
....DINOBRYON	--	-	--	-	120	1
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	290	1	--	-	700	5
...CRYPTOMONADACEAE						
....CRYPTOMONAS	860	2	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	10000#	19	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	680	1	230	2
....TRACHELOMONAS	--	-	--	-	120	1
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GLENODINIACEAE						
....GLENODINIUM	290	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMMOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	528	519	524	557	550	553	580	576	579	602	591	597
2	537	524	531	562	557	559	580	563	571	612	599	604
3	536	529	532	566	562	564	572	565	569	612	601	606
4	535	525	530	564	556	559	579	573	577	607	602	604
5	536	527	532	560	555	557	579	576	578	614	608	611
6	537	531	535	566	559	563	577	572	575	618	615	616
7	542	536	540	572	566	569	572	559	567	618	612	614
8	551	540	543	575	564	571	559	539	547	622	616	619
9	557	550	553	569	563	566	543	536	540	618	615	617
10	558	552	555	566	562	565	537	510	525	621	616	619
11	556	544	546	570	565	568	517	511	515	621	618	619
12	547	541	544	572	568	570	511	497	503	623	619	621
13	554	542	547	578	574	576	494	486	487	622	617	620
14	558	555	556	578	576	577	495	486	489	625	617	622
15	562	559	561	578	576	577	503	496	501	624	618	622
16	565	561	563	580	577	579	512	506	509	620	616	617
17	567	557	562	579	575	577	525	514	520	627	616	622
18	559	549	553	580	576	579	530	520	527	627	621	623
19	554	549	552	579	575	577	541	522	535	624	615	621
20	558	554	556	582	577	580	545	539	542	622	618	620
21	559	550	553	578	573	575	544	538	542	629	618	623
22	560	554	557	583	579	581	550	543	547	630	618	623
23	563	557	560	587	584	586	555	551	554	618	615	617
24	564	557	561	588	583	586	563	555	559	624	613	617
25	561	542	550	588	585	587	572	562	566	620	616	618
26	543	539	541	590	586	588	588	575	581	617	610	614
27	554	544	552	591	589	590	596	583	589	612	607	610
28	556	550	553	589	577	584	603	597	601	609	602	607
29	557	552	555	579	570	573	610	599	602	609	600	606
30	562	555	558	575	570	572	601	595	598	614	605	610
31	561	551	556	---	---	---	607	597	600	621	612	617
MONTH	567	519	549	591	550	574	610	486	551	630	591	615

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	627	615	619	438	429	434	547	541	544	379	360	366
2	615	610	613	442	435	438	544	533	539	384	374	379
3	617	604	612	455	442	448	544	536	541	392	372	382
4	623	605	617	469	454	462	541	525	534	461	393	431
5	621	608	615	541	469	484	546	530	536	550	461	490
6	619	606	612	509	489	498	588	543	566	510	470	489
7	620	606	612	517	490	509	605	580	594	550	457	493
8	615	602	609	530	517	524	583	566	573	687	548	620
9	619	609	613	536	525	531	579	558	564	726	609	687
10	622	605	613	547	537	540	697	560	640	590	475	517
11	624	608	617	554	545	548	703	668	690	475	352	414
12	624	610	618	557	546	551	663	569	621	351	324	335
13	626	612	621	567	551	557	608	565	586	352	332	343
14	628	621	625	571	562	567	601	495	558	350	326	335
15	660	622	631	575	569	573	500	477	490	381	341	359
16	649	553	608	580	575	578	639	475	545	393	355	376
17	560	498	532	590	571	580	611	464	543	390	365	377
18	516	463	483	595	584	590	455	404	424	400	386	395
19	500	473	482	595	571	583	404	393	398	415	400	407
20	503	478	494	589	571	580	413	390	398	432	416	424
21	481	419	447	595	586	590	436	408	447	461	430	446
22	428	407	414	596	582	590	508	496	501	460	446	448
23	429	409	416	600	575	587	504	494	501	461	450	456
24	437	423	429	589	579	583	496	416	453	504	461	473
25	445	426	435	596	584	591	461	442	453	625	475	525
26	442	423	431	591	564	573	445	405	429	490	480	485
27	424	409	416	570	557	564	406	395	403	545	482	496
28	427	415	422	571	555	565	395	363	386	505	488	495
29	---	---	---	571	553	561	365	348	356	516	494	503
30	---	---	---	556	540	548	358	346	351	571	516	534
31	---	---	---	548	536	542	---	---	---	541	525	531
MONTH	660	407	545	600	429	544	703	346	505	726	324	452

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	551	537	544	489	480	484	621	551	578	500	493	496
2	540	524	533	499	490	493	578	542	555	498	424	471
3	522	505	509	506	502	504	586	541	570	465	420	432
4	511	505	508	507	504	506	570	535	551	423	387	408
5	512	509	511	515	507	510	551	530	542	389	362	381
6	520	509	514	530	517	522	547	501	528	429	342	376
7	509	504	507	532	527	530	543	510	529	435	396	413
8	515	501	511	532	523	527	568	542	553	434	393	416
9	525	501	508	525	516	520	543	524	533	416	381	398
10	531	502	511	518	514	517	559	540	545	423	334	393
11	518	510	515	516	493	505	581	562	570	486	384	438
12	523	518	520	507	490	500	582	527	557	391	349	368
13	522	491	506	496	488	492	525	511	515	413	333	349
14	493	472	480	492	482	487	522	518	520	416	385	398
15	472	462	467	484	482	483	524	521	522	388	364	380
16	513	472	494	486	482	485	522	513	518	642	366	512
17	518	491	507	499	485	492	513	504	508	640	609	628
18	518	454	492	501	493	497	503	497	500	644	562	611
19	493	446	464	516	501	508	508	503	506	603	545	570
20	505	479	494	518	509	513	508	504	506	601	546	570
21	495	418	463	520	512	516	509	507	507	600	559	580
22	463	412	439	518	509	513	511	502	507	572	525	551
23	503	466	485	521	511	516	502	490	496	602	518	549
24	521	505	511	540	522	528	494	479	488	596	532	567
25	524	512	516	562	540	549	503	486	492	628	507	543
26	513	499	506	566	562	564	511	504	507	507	493	496
27	500	485	491	571	567	569	514	501	507	634	480	501
28	492	481	486	574	542	555	505	478	498	---	---	---
29	493	484	486	596	550	563	507	478	494	---	---	---
30	488	480	484	623	600	608	504	464	474	---	---	---
31	---	---	---	626	618	621	526	479	494	---	---	---
MONTH	551	412	499	626	480	522	621	464	522			

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.5	17.0	18.0	7.0	6.0	6.5	4.5	3.0	3.5	.0	.0	.0
2	18.0	15.5	17.0	7.5	4.5	6.0	3.5	1.0	2.5	.0	.0	.0
3	17.0	14.5	16.0	9.5	5.5	7.5	1.0	.0	.5	.5	.0	.0
4	14.5	12.5	13.5	9.5	7.0	8.0	1.0	.0	.5	.5	.0	.0
5	14.0	12.0	13.0	7.0	5.5	6.5	1.0	.5	.5	.5	.0	.0
6	12.5	11.0	12.0	9.0	5.0	7.0	4.0	1.0	2.5	.5	.0	.0
7	14.0	11.0	12.5	8.5	7.0	8.0	5.5	3.5	5.0	.5	.0	.0
8	15.5	12.5	14.0	8.0	6.5	7.5	5.0	4.0	5.0	.5	.0	.0
9	15.0	12.5	14.0	10.0	7.5	8.5	4.0	2.5	3.5	.5	.0	.0
10	14.5	12.0	13.0	8.5	6.0	7.0	2.5	1.0	2.0	.5	.0	.0
11	13.5	11.0	12.0	7.0	4.5	5.5	1.5	.5	1.0	.5	.0	.0
12	11.0	9.0	10.5	5.5	3.5	4.5	2.5	.5	1.5	.0	.0	.0
13	12.0	8.5	10.5	6.5	4.0	5.5	2.5	.0	1.5	.5	.0	.0
14	11.0	9.5	10.0	6.5	5.5	6.0	1.0	.5	.5	.0	.0	.0
15	11.0	8.5	10.0	6.0	5.0	5.5	1.5	.0	.5	.5	.0	.0
16	13.5	10.5	11.5	6.0	4.0	5.0	1.0	.5	.5	.5	.0	.0
17	15.0	13.0	14.0	5.0	3.0	4.0	.5	.0	.5	.0	.0	.0
18	13.0	11.0	12.0	4.0	3.0	3.5	.5	.0	.0	.5	.0	.0
19	11.0	10.0	10.5	6.0	3.0	4.0	.0	.0	.0	.5	.0	.0
20	11.0	9.0	10.0	6.0	2.0	4.0	.0	.0	.0	.5	.0	.0
21	11.5	10.0	10.5	4.0	2.5	3.5	.5	.0	.0	.0	.0	.0
22	11.0	8.5	10.0	6.0	1.0	3.0	.5	.0	.0	.5	.0	.0
23	11.5	8.0	9.5	4.0	2.5	3.5	.5	.0	.0	.5	.0	.0
24	11.0	8.0	10.0	4.5	3.5	4.0	.5	.0	.0	.5	.0	.0
25	10.0	7.5	9.0	4.5	2.5	3.5	.5	.0	.0	.5	.0	.0
26	7.5	4.5	6.0	4.5	1.0	3.0	.0	.0	.0	.5	.0	.0
27	6.5	4.5	5.5	3.5	1.0	2.0	.5	.0	.0	.5	.0	.0
28	7.0	4.5	6.0	2.0	1.5	1.5	.5	.0	.0	.5	.0	.5
29	7.5	3.5	6.0	2.0	1.5	2.0	.5	.0	.0	.5	.5	.5
30	8.5	4.5	6.0	4.5	1.5	3.0	.5	.0	.0	.5	.0	.5
31	9.0	6.0	7.0	---	---	---	.0	.0	.0	.5	.0	.5
MONTH	18.5	3.5	11.0	10.0	1.0	5.0	5.5	.0	1.0	.5	.0	.0

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.5	3.5	2.0	3.0	13.0	10.0	11.5	16.0	12.5	14.0
2	.5	.0	.0	2.5	1.0	2.0	15.5	7.5	11.5	16.5	11.5	14.0
3	.5	.0	.0	5.5	.5	2.5	15.0	10.5	13.0	18.5	12.0	15.5
4	.5	.0	.0	4.0	2.0	3.0	16.5	13.0	14.5	19.5	15.0	17.5
5	.5	.0	.0	6.0	2.0	3.5	12.5	7.0	10.0	18.0	15.0	17.0
6	.5	.0	.0	4.0	1.0	2.5	13.5	5.0	9.5	17.0	12.5	15.0
7	.0	.0	.0	3.0	1.0	1.5	15.0	7.0	11.5	18.0	13.0	15.5
8	.5	.0	.0	5.5	1.0	2.5	13.0	11.5	12.5	18.0	13.5	16.0
9	.0	.0	.0	7.0	1.5	4.0	16.5	10.0	13.0	19.5	15.5	17.0
10	.0	.0	.0	6.0	3.0	4.5	15.5	10.5	13.0	18.0	11.5	14.5
11	.0	.0	.0	6.0	2.0	3.5	15.5	13.5	14.5	11.0	9.0	10.0
12	.5	.0	.0	8.0	1.5	4.5	14.0	11.5	12.5	13.5	8.0	10.5
13	.5	.0	.0	6.0	2.5	4.5	15.5	11.5	13.0	15.0	11.0	13.0
14	.0	.0	.0	10.0	1.5	4.5	15.0	12.0	13.5	13.0	11.0	11.5
15	.0	.0	.0	8.5	2.0	5.0	15.0	9.5	12.5	14.5	10.5	12.0
16	.5	.0	.5	7.0	2.5	4.5	14.5	10.5	12.5	17.0	11.5	14.0
17	.5	.0	.5	5.5	3.0	4.5	18.0	12.5	15.0	16.5	13.5	15.0
18	.5	.0	.5	4.5	2.0	3.5	17.0	13.0	15.0	16.0	13.0	14.5
19	1.0	.0	.5	2.5	1.5	2.5	14.0	12.5	13.5	17.5	13.0	15.0
20	1.0	.0	.5	3.0	1.5	2.5	14.0	10.0	12.0	19.0	14.0	16.5
21	1.0	.0	.5	7.5	1.0	4.0	15.5	10.0	13.0	20.0	15.0	17.5
22	2.5	.5	1.5	7.5	2.5	5.0	13.0	11.5	12.5	20.0	17.0	18.5
23	3.5	2.0	3.0	8.5	2.5	6.0	13.0	10.0	12.0	21.0	17.5	19.5
24	5.0	3.0	4.0	7.5	5.0	6.5	11.5	8.5	10.0	22.0	19.0	20.0
25	6.0	2.0	3.5	9.5	3.5	7.0	13.5	8.5	11.0	23.0	18.5	21.0
26	5.5	2.0	3.5	10.0	5.5	7.5	13.5	10.0	12.0	22.5	19.5	21.0
27	2.5	1.5	2.0	12.0	6.5	9.5	16.0	11.0	13.5	23.0	20.0	21.0
28	4.0	3.0	3.5	13.5	6.5	10.0	16.0	14.0	15.0	23.5	18.5	21.0
29	---	---	---	13.0	10.0	11.5	15.5	12.5	14.0	23.0	20.0	21.5
30	---	---	---	14.0	11.0	12.0	15.5	11.5	13.5	23.0	20.0	21.5
31	---	---	---	17.0	9.0	13.0	---	---	---	22.5	17.5	20.0
MONTH	6.0	.0	1.0	17.0	.5	5.0	18.0	5.0	12.5	23.5	8.0	16.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	22.5	18.0	20.5	24.0	21.5	23.0	25.5	22.0	24.0	24.0	23.0	23.5
2	22.0	19.5	21.0	24.5	22.0	23.0	25.0	23.0	24.0	23.5	22.0	23.0
3	24.0	20.5	22.5	25.0	22.5	24.0	25.5	23.0	24.0	22.5	21.5	22.0
4	24.0	21.0	22.5	26.5	23.5	25.0	25.5	23.5	24.5	23.5	20.5	22.0
5	24.0	20.5	22.5	26.5	24.5	25.5	24.5	22.5	24.0	22.0	21.0	21.5
6	25.0	21.0	23.0	27.0	24.0	25.5	25.5	23.0	24.5	22.5	20.0	21.5
7	24.5	20.5	23.0	28.0	24.5	26.5	26.0	24.0	25.0	23.0	20.5	21.5
8	23.5	21.0	22.5	29.5	26.0	27.5	25.5	24.0	24.5	22.0	20.5	21.5
9	22.5	20.0	21.5	28.0	26.0	27.0	26.0	22.5	24.5	22.0	19.5	20.5
10	23.5	20.0	22.0	27.5	24.5	26.0	25.5	24.0	24.5	22.5	19.5	21.0
11	23.5	20.5	22.0	27.0	24.5	26.0	25.5	23.0	24.5	24.0	21.0	22.5
12	24.0	20.5	22.5	27.5	25.0	26.0	25.5	23.0	24.5	24.0	21.5	23.0
13	23.5	21.5	22.5	28.5	26.5	27.5	26.5	23.5	25.0	24.0	21.0	22.5
14	25.0	22.5	23.5	27.5	25.0	26.5	25.5	23.5	24.5	24.0	22.0	23.0
15	26.5	23.5	25.0	27.0	23.5	24.5	24.5	23.0	23.5	22.5	20.0	21.5
16	24.5	21.5	23.0	25.5	22.5	24.0	23.5	22.0	23.0	21.5	18.0	19.5
17	24.5	20.0	22.0	27.0	23.0	25.0	23.0	20.5	22.0	18.5	15.5	16.5
18	24.0	21.0	22.5	27.5	24.5	26.0	23.5	20.0	22.0	17.5	14.0	16.0
19	24.5	21.5	23.0	27.0	25.5	26.0	23.5	20.5	22.0	18.0	15.5	17.0
20	23.0	21.0	22.5	26.0	24.5	25.5	24.0	20.5	22.5	18.5	15.5	17.0
21	23.5	20.5	22.0	25.5	23.5	25.0	24.0	21.0	22.5	17.5	13.5	15.5
22	23.0	20.5	22.0	24.5	21.5	23.5	23.5	21.5	23.0	15.5	12.5	14.0
23	24.0	19.5	22.0	24.5	21.0	23.0	24.0	21.5	23.0	16.0	12.5	14.5
24	23.5	20.5	22.5	25.5	22.5	24.0	25.0	22.0	23.5	17.0	14.0	15.5
25	25.0	21.5	23.0	26.0	24.0	25.0	24.5	22.0	23.5	16.5	15.5	16.0
26	24.0	21.0	22.5	25.5	24.0	25.0	25.0	22.0	23.5	17.5	15.5	16.5
27	24.0	20.0	22.0	24.0	22.0	23.0	24.0	22.5	23.0	17.5	15.0	16.5
28	23.5	20.5	22.0	22.0	20.0	20.5	24.5	22.0	23.0	17.0	12.5	15.0
29	25.5	21.0	23.5	23.0	18.5	20.5	24.0	23.0	23.5	15.0	13.0	14.0
30	25.0	23.5	24.0	24.0	19.5	22.0	25.5	22.5	24.0	---	---	---
31	---	---	---	24.5	21.0	23.0	24.5	23.5	24.0	---	---	---
MONTH	26.5	18.0	22.5	29.5	18.5	24.5	26.5	20.0	23.5			

04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW¼ sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft (6 m) upstream from bridge on State Road, 0.2 mi (0.3 km) downstream from South Branch, and 2.5 mi (4.0 km) south of Zeeland.

DRAINAGE AREA.--65.8 mi^2 (170.4 km^2).

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft (178.52 m) National Geodetic Vertical Datum of 1929 (levels by Gove Associates, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 64.5 ft^3/s (1.827 m^3/s), 13.31 in/yr (338 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,220 ft^3/s (204 m^3/s) May 11, 1981, gage height, 15.81 ft (4.819 m); minimum, 0.9 ft^3/s (0.025 m^3/s) Aug. 24, 1962; minimum gage height, 1.66 ft (0.506 m) Aug. 23, 24, 1981.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft^3/s (25.5 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 8	2300	933	26.4	9.93	3.027	Apr. 14	1400	1,290	36.5	10.88	3.316
Feb. 18	--	2,560	72.5	ice jam		May 11	1300	*7,220	204	*15.81	4.819
Apr. 11	1500	1,170	33.1	10.58	3.225						

Minimum discharge, 2.6 ft^3/s (0.074 m^3/s) Aug. 23, 24, gage height, 1.66 ft (0.506 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	14	116	17	18	143	31	36	16	43	5.0	4.8
2	11	13	211	17	18	83	24	30	15	18	4.5	4.8
3	23	12	94	17	18	56	21	27	15	14	4.8	4.5
4	30	23	61	17	18	53	23	25	14	12	4.8	4.5
5	17	38	36	16	18	56	19	25	13	11	4.5	3.8
6	14	22	150	16	18	43	17	24	12	9.3	4.5	3.8
7	12	18	641	16	18	34	16	22	11	8.2	5.0	3.8
8	11	17	865	15	18	31	16	21	13	7.5	4.8	4.3
9	10	16	678	15	18	31	121	21	17	6.7	4.3	3.8
10	9.0	15	203	15	18	32	43	205	14	6.4	4.0	3.5
11	8.5	13	74	15	18	30	837	4600	12	6.0	4.0	3.5
12	8.5	12	47	15	18	28	727	2250	11	6.0	3.8	3.3
13	8.2	12	43	15	19	27	392	805	340	21	3.8	3.2
14	9.1	14	33	15	20	23	894	208	447	11	3.8	3.3
15	9.6	14	26	15	35	23	475	107	357	7.9	5.3	3.3
16	17	13	24	15	90	21	101	77	85	7.5	4.5	4.3
17	94	12	22	15	500	21	68	57	46	6.4	3.5	5.8
18	138	12	19	15	1950	19	47	48	31	5.8	3.5	6.0
19	39	11	18	15	2200	18	89	41	25	5.3	3.3	4.5
20	23	11	17	15	1130	19	103	37	22	5.5	3.2	4.3
21	18	11	16	15	541	18	49	32	22	5.8	3.2	4.3
22	15	10	16	15	265	18	47	29	26	5.0	3.3	6.4
23	13	11	16	15	360	18	497	26	21	4.8	3.0	4.8
24	13	12	15	16	245	18	222	28	18	4.5	3.2	4.0
25	54	12	15	16	127	17	91	29	17	4.3	3.2	4.5
26	95	11	15	16	89	53	54	25	14	22	3.2	20
27	45	11	15	16	72	55	41	22	13	7.9	5.0	14
28	26	14	15	17	342	29	39	20	12	20	10	6.7
29	20	20	15	17	---	25	117	19	11	16	14	5.0
30	17	45	15	17	---	65	56	21	37	7.9	5.8	106
31	15	---	16	17	---	58	---	18	---	6.0	4.8	---
TOTAL	834.9	469	3547	488	8201	1165	5277	8935	1707	322.7	143.6	258.8
MEAN	26.9	15.6	114	15.7	293	37.6	176	288	56.9	10.4	4.63	8.63
MAX	138	45	865	17	2200	143	894	4600	447	43	14	106
MIN	8.2	10	15	15	18	17	16	18	11	4.3	3.0	3.2
CFSM	.41	.24	1.73	.24	4.45	.57	2.68	4.38	.87	.16	.07	.13
IN.	.47	.27	2.01	.28	4.64	.66	2.98	5.05	.97	.18	.08	.15

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CAL YR 1980  TOTAL  25925.0   MEAN 70.8   MAX  1690   MIN 5.1   CFSM 1.08   IN 14.66
WTR YR 1981  TOTAL  31349.0   MEAN 85.9   MAX  4600   MIN 3.0   CFSM 1.31   IN 17.72
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04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi (2 km) north of Jackson, 2.2 mi (3.5 km) upstream from Portage River, and at mile 216 (348 km).

DRAINAGE AREA.--174 mi^2 (451 km^2).

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft (274.320 m) Fargo Engineering Co. datum. Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills above station. Flow includes about 17 ft^3/s (0.48 m^3/s) as sewage effluent, which originates from ground water sources, from the city of Jackson. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--46 years, 120 ft^3/s (3.398 m^3/s), 9.37 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft^3/s (30.3 m^3/s) June 25, 1937, gage height, 13.50 ft (4.115 m); maximum gage height, 15.44 ft (4.706 m) June 25, 1968; minimum discharge, 9.2 ft^3/s (0.26 m^3/s) Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 498 ft^3/s (14.1 m^3/s) Apr. 23, gage height, 11.63 ft (3.545 m); minimum, 43 ft^3/s (1.22 m^3/s) July 19, gage height, 8.52 ft (2.597 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	81	137	132	78	87	320	183	247	204	90	232	94
2	85	133	120	76	145	300	176	216	244	85	214	89
3	83	135	93	74	136	282	175	205	223	77	229	99
4	72	93	101	72	135	258	207	206	181	107	223	165
5	66	73	154	70	133	244	183	206	171	117	217	207
6	71	70	159	72	129	230	182	201	162	150	209	179
7	78	112	210	82	73	210	180	194	148	145	201	161
8	129	72	233	74	61	194	177	187	161	140	155	170
9	130	62	249	74	66	189	185	174	231	141	120	160
10	126	68	265	76	66	186	124	192	233	80	114	115
11	73	67	238	74	94	172	201	223	196	68	110	104
12	54	66	213	72	80	123	199	227	176	60	102	94
13	58	72	210	70	88	116	270	257	221	98	97	83
14	59	133	201	70	143	106	349	261	251	76	90	87
15	59	129	200	70	147	102	328	252	226	68	85	85
16	61	124	195	70	179	118	322	260	251	65	75	102
17	126	126	131	66	199	165	323	247	241	60	77	161
18	125	75	138	106	218	165	316	245	224	54	117	160
19	121	68	109	128	290	160	275	244	222	57	120	154
20	73	67	89	131	338	159	252	242	221	81	111	139
21	67	67	90	119	353	152	243	236	218	198	68	119
22	66	63	91	71	369	147	241	226	264	148	59	151
23	65	59	86	70	400	150	313	216	219	144	51	179
24	129	68	128	67	390	150	311	218	207	142	56	206
25	139	122	131	66	380	102	276	208	199	133	57	187
26	122	130	133	83	370	118	242	199	158	126	55	166
27	76	78	74	78	360	161	265	225	118	101	103	193
28	78	74	60	78	340	165	290	236	104	250	88	186
29	77	127	70	77	---	162	303	232	101	262	149	188
30	79	128	76	74	---	176	289	266	97	272	145	287
31	127	---	80	73	---	178	---	242	---	265	141	---
TOTAL	2755	2798	4459	2461	5769	5460	7380	6990	5872	3860	3870	4470
MEAN	88.9	93.3	144	79.4	206	176	246	225	196	125	125	149
MAX	139	137	265	131	400	320	349	266	264	272	232	287
MIN	54	59	60	66	61	102	124	174	97	54	51	83
CFSM	.51	.54	.83	.46	1.18	1.01	1.41	1.29	1.13	.72	.72	.86
IN.	.59	.60	.95	.53	1.23	1.17	1.58	1.49	1.26	.83	.83	.96

CAL YR 1980 TOTAL 50813 MEAN 139 MAX 361 MIN 40 CFSM .80 IN 10.86
WTR YR 1981 TOTAL 56144 MEAN 154 MAX 400 MIN 51 CFSM .89 IN 12.00

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'25", in NE¼ sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft (122 m) upstream from bridge on Petrieville Highway, 2 mi (3 km) northeast of Eaton Rapids, 2.5 mi (4.0 km) downstream from Spring Brook, 25 mi (40 km) upstream from Red Cedar River, and at mile 178 (286 km).

DRAINAGE AREA.--661 mi^2 (1,712 km^2).

PERIOD OF RECORD.--October 1950 to current year. Gage-height record for flood seasons collected in this vicinity 1905-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1707: 1951(M).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft (259.897 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant at Smithville and mills at Eaton Rapids. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 457 ft^3/s (12.94 m^3/s), 9.39 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,500 ft^3/s (99.1 m^3/s) Feb. 21, 1971; maximum gage height, 8.19 ft (2.496 m) June 28, 1968; minimum discharge, 14 ft^3/s (0.40 m^3/s) Dec. 20, 1962, Oct. 14, 1966; minimum gage height, 0.67 ft (0.204 m) Dec. 20, 1962; minimum daily discharge, 21 ft^3/s (0.59 m^3/s) Oct. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft (2.484 m), discharge, 3,860 ft^3/s (109 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,930 ft^3/s (83.0 m^3/s) Feb. 19, gage height, 7.28 ft (2.219 m); minimum, 38 ft^3/s (1.08 m^3/s) Aug. 28, gage height, 0.98 ft (0.299 m); minimum daily, 97 ft^3/s (2.75 m^3/s) July 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	426	314	315	310	282	1400	661	1070	609	291	599	522
2	401	306	412	300	300	1350	639	1030	636	245	511	404
3	376	329	536	300	300	1280	659	972	627	244	516	383
4	369	341	528	290	290	1170	653	900	618	245	536	411
5	363	341	484	290	290	1110	635	843	495	235	389	552
6	349	330	479	280	300	1090	629	800	528	232	388	591
7	329	323	580	270	310	1020	625	747	453	274	392	618
8	314	319	739	330	310	966	623	715	380	327	361	612
9	307	298	865	270	270	932	638	682	490	322	396	520
10	308	259	916	280	290	894	641	669	411	265	351	501
11	326	313	961	290	300	849	799	874	324	238	234	401
12	312	242	933	280	310	839	976	948	444	232	230	351
13	294	258	883	270	340	804	1030	1040	570	189	240	289
14	211	278	824	270	380	756	1340	1040	519	164	235	294
15	224	255	831	270	464	710	1270	994	568	227	198	289
16	231	307	789	260	565	660	1370	957	639	277	195	229
17	293	300	684	260	1110	558	1220	928	665	196	227	284
18	304	307	641	260	2090	578	1150	892	646	156	199	337
19	329	313	684	260	2710	525	1090	843	563	97	157	341
20	359	306	540	260	2640	600	1020	796	558	162	201	351
21	349	240	450	260	2340	576	1010	758	503	182	202	341
22	328	249	380	280	2100	449	975	740	571	294	181	353
23	295	277	370	310	1830	585	1100	707	555	306	204	474
24	316	261	360	330	1760	507	1230	671	549	297	158	496
25	299	236	430	290	1640	496	1320	630	604	221	156	415
26	372	266	350	300	1600	505	1290	672	475	236	137	413
27	387	311	320	320	1520	579	1180	681	412	242	172	481
28	417	314	310	358	1460	545	1050	631	454	348	157	450
29	345	277	310	363	---	572	1110	533	330	515	371	444
30	351	318	310	336	---	651	1090	552	335	504	471	536
31	325	---	310	273	---	665	---	598	---	598	529	---
TOTAL	10209	8788	17524	9020	28101	24221	29023	24913	15531	8361	9293	12683
MEAN	329	293	565	291	1004	781	967	804	518	270	300	423
MAX	426	341	961	363	2710	1400	1370	1070	665	598	599	618
MIN	211	236	310	260	270	449	623	533	324	97	137	229
CFSM	.50	.44	.86	.44	1.52	1.18	1.46	1.22	.78	.41	.45	.64
IN.	.57	.49	.99	.51	1.58	1.36	1.63	1.40	.87	.47	.52	.71

CAL YR 1980 TOTAL 185025 MEAN 506 MAX 1480 MIN 140 CFSM .77 IN 10.41
WTR YR 1981 TOTAL 197667 MEAN 542 MAX 2710 MIN 97 CFSM .82 IN 11.12

04111379 RED CEDAR RIVER NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'59", long 84°13'09", in NE¼ sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank 20 ft (6 m) upstream from bridge on State Highway 52, 1.5 mi (2.4 km) upstream from Squaw Creek, and 3.5 mi (5.6 km) east of Williamston.

DRAINAGE AREA.--163 mi^2 (422 km^2).

PERIOD OF RECORD.--July 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 870 ft (265 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--6 years, 94.5 ft^3/s (2.676 m^3/s), 7.87 in/yr (200 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 990 ft^3/s (28.0 m^3/s) Mar. 5, 6, 1976, gage height, 7.60 ft (2.316 m); minimum, 5.1 ft^3/s (0.14 m^3/s) Sept. 12, 1978, gage height, 2.03 ft (0.619 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft (3.173 m) Apr. 19, and a discharge of 2,640 ft^3/s (74.8 m^3/s) Apr. 20.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 942 ft^3/s (26.7 m^3/s) Feb. 19, gage height, 7.48 ft (2.280 m); minimum 12 ft^3/s (0.34 m^3/s) Aug. 24, gage height, 2.22 ft (0.677 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	62	58	45	42	352	146	188	57	30	21	29
2	83	60	83	45	42	317	136	165	54	30	20	23
3	76	58	116	45	41	278	122	138	51	29	18	24
4	78	58	122	45	39	244	115	115	50	27	18	59
5	77	57	120	45	38	211	124	99	48	28	18	107
6	73	56	114	45	38	177	124	89	46	28	17	96
7	69	57	146	45	37	146	112	78	42	28	17	86
8	64	60	213	44	37	125	98	70	43	25	17	79
9	59	61	285	44	37	111	100	65	46	23	17	69
10	55	61	290	44	37	107	109	73	48	21	18	54
11	53	58	276	43	40	105	176	234	45	20	18	42
12	51	56	256	43	45	100	298	421	42	19	16	33
13	49	55	230	42	52	98	348	419	49	19	16	29
14	49	55	189	41	58	92	390	417	72	18	16	26
15	57	54	168	40	64	88	410	394	81	17	16	24
16	61	54	120	38	130	86	382	365	72	17	17	23
17	67	53	100	37	377	85	354	324	62	16	16	28
18	82	52	84	37	718	80	318	273	53	16	16	37
19	85	50	72	37	918	73	275	216	47	15	15	37
20	82	49	68	38	816	69	228	157	42	15	14	32
21	76	49	60	39	774	67	178	124	40	18	15	30
22	69	48	53	40	708	67	139	103	45	19	14	80
23	63	48	50	41	663	67	170	90	55	17	14	93
24	61	48	47	43	606	67	234	82	57	17	13	75
25	66	49	45	45	536	67	254	88	51	17	13	60
26	70	48	44	49	474	76	258	84	45	17	14	52
27	72	47	43	51	419	117	244	76	39	18	15	55
28	72	50	43	54	380	134	218	74	34	22	20	59
29	69	53	43	52	---	135	204	70	32	29	24	54
30	67	55	43	45	---	135	199	65	30	29	38	57
31	65	---	44	43	---	146	---	61	---	24	33	---
TOTAL	2126	1621	3625	1345	8166	4022	6463	5217	1478	668	554	1552
MEAN	68.6	54.0	117	43.4	292\	130	215	168	49.3	21.5	17.9	51.7
MAX	106	62	290	54	918	352	410	421	81	30	38	107
MIN	49	47	43	37	37	67	98	61	30	15	13	23
CFSM	.42	.33	.72	.27	1.79	.80	1.32	1.03	.30	.13	.11	.32
IN.	.49	.37	.83	.31	1.86	.92	1.47	1.19	.34	.15	.13	.35

CAL YR 1980 TOTAL 36383 MEAN 99.4 MAX 455 MIN 25 CFSM .61 IN 8.30
WTR YR 1981 TOTAL 36837 MEAN 101 MAX 918 MIN 13 CFSM .62 IN 8.41

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E½ sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft (5 m) upstream from bridge on Clark Road, 3.5 mi (5.6 km) north of Dansville, and 7.2 mi (11.6 km) upstream from mouth.

DRAINAGE AREA.--16.3 mi² (42.2 km²).

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft (270.992 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 10.4 ft³/s (0.295 m³/s), 8.66 in/yr (220 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft³/s (27.2 m³/s) Apr. 19, 1975, gage height, 12.18 ft (3.712 m), from flood mark, rating curve extended above 610 ft³/s (17.3 m³/s); minimum, 0.04 ft³/s (0.001 m³/s) Sept. 8, 9, 12, 1978, gage height, 2.58 ft (0.786 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	(m³/s)	Gage height (ft)	(m)	Date	Time	Discharge (ft³/s)	(m³/s)	Gage height (ft)	(m)
Dec. 8	2200	107	3.03	4.47	1.362	Apr. 14	1200	126	3.57	4.75	1.448
Feb. 17	2400	*328	9.29	*7.39	2.252						

Minimum discharge, 0.14 ft³/s (0.004 m³/s) Aug. 25, 26, gage height, 2.67 ft (0.814 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.5	6.1	7.0	3.5	3.5	25	14	17	4.0	1.6	.90	1.7
2	5.2	5.7	28	3.5	3.4	21	12	14	3.5	1.6	.90	1.7
3	5.0	5.4	25	3.5	3.3	17	11	12	3.5	1.3	.90	1.6
4	7.4	5.7	16	3.5	3.2	15	12	11	3.3	1.3	.81	8.9
5	7.2	5.4	14	3.5	3.1	14	11	10	2.9	1.2	.90	12
6	7.0	5.0	18	3.6	3.0	13	8.9	8.9	2.9	1.0	.58	7.2
7	6.8	5.0	46	3.6	3.0	12	8.0	8.0	2.5	.90	.51	4.7
8	6.1	5.7	69	3.6	3.0	11	7.2	7.6	2.9	.81	.51	3.7
9	5.4	6.1	77	3.6	3.0	11	11	6.8	3.5	.81	.58	2.9
10	4.7	5.7	44	3.5	3.0	11	10	13	3.1	.81	.81	2.5
11	4.7	5.0	26	3.5	3.0	11	45	74	2.7	.81	.65	2.2
12	4.5	4.7	20	3.5	3.5	10	75	53	2.4	.81	.51	1.9
13	4.2	4.7	17	3.4	4.0	11	48	31	5.4	.73	.58	1.7
14	4.0	5.0	14	3.3	4.5	9.4	98	22	9.4	.58	.45	1.7
15	5.0	5.0	12	3.2	15	9.4	55	23	8.0	.51	.58	1.7
16	5.4	4.7	10	3.1	63	9.4	32	20	5.7	.58	.51	1.9
17	6.8	4.5	7.6	3.0	235	8.5	25	16	4.5	.65	.45	2.4
18	11	4.7	6.8	3.0	287	7.6	20	13	3.7	.58	.34	2.5
19	9.4	4.5	5.7	3.0	207	6.8	17	12	3.1	.51	.34	2.2
20	8.0	4.5	4.7	3.0	121	6.4	16	9.4	2.7	.73	.29	2.2
21	7.6	4.5	4.5	3.0	70	6.4	13	8.5	2.5	1.0	.25	2.5
22	6.4	4.5	4.2	3.0	58	6.8	13	7.2	4.7	.81	.25	6.1
23	5.7	4.2	4.0	3.1	71	7.2	44	6.8	4.2	.65	.21	5.4
24	5.7	4.7	3.7	3.2	59	7.2	34	6.4	3.3	.58	.17	4.2
25	8.5	5.0	3.6	3.3	43	7.2	25	8.9	2.9	.51	.17	3.7
26	9.4	4.5	3.5	3.5	32	12	20	7.2	2.4	.65	.21	4.0
27	8.0	4.5	3.4	3.7	25	19	17	6.4	2.0	.90	.62	6.8
28	7.6	5.4	3.4	4.0	26	14	16	6.1	1.9	3.1	1.1	7.6
29	7.2	6.1	3.4	4.3	---	13	23	5.4	1.7	3.1	1.3	6.1
30	6.8	6.4	3.4	4.0	---	16	21	5.0	1.6	1.6	6.1	12
31	6.4	---	3.4	3.4	---	18	---	4.2	---	1.2	2.9	---
TOTAL	202.6	152.9	508.3	105.9	1358.5	366.3	762.1	453.8	106.9	31.92	25.38	125.7
MEAN	6.54	5.10	16.4	3.42	48.5	11.8	25.4	14.6	3.56	1.03	.82	4.19
MAX	11	6.4	77	4.3	287	25	98	74	9.4	3.1	6.1	12
MIN	4.0	4.2	3.4	3.0	3.0	6.4	7.2	4.2	1.6	.51	.17	1.6
CFSM	.40	.31	1.01	.21	2.98	.72	1.56	.90	.22	.06	.05	.26
IN.	.46	.35	1.16	.24	3.10	.84	1.74	1.04	.24	.07	.06	.29

CAL YR 1980 TOTAL 4315.36 MEAN 11.8 MAX 175 MIN .79 CFSM .72 IN 9.85
WTR YR 1981 TOTAL 4200.30 MEAN 11.5 MAX 287 MIN .17 CFSM .71 IN 9.59

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE¼ NE¼ sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft (9 m) downstream from bridge on Meridian Road, 2.1 mi (3.4 km) upstream from mouth, and 4.2 mi (6.8 km) west of Williamston.

DRAINAGE AREA.--9.34 mi^2 (24.19 km^2).

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft (262.774 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 5.55 ft^3/s (0.157 m^3/s), 8.07 in/yr (205 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft^3/s (36.5 m^3/s) Apr. 18, 1975, gage height, 9.99 ft (3.045 m), from rating curve extended above 660 ft^3/s (18.7 m^3/s) on basis of computation of peak flow through culvert and over road embankment; minimum, 0.01 ft^3/s (<0.001 m^3/s) Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft (0.335 m), caused by unusual regulation; minimum natural discharge, 0.02 ft^3/s (0.001 m^3/s) July 27, 1965, gage height, 1.18 ft (0.360 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 211 ft^3/s (5.98 m^3/s) Sept. 30, stage rising, peak occurred Oct. 1, 1981; maximum peak discharge, 208 ft^3/s (5.89 m^3/s) Feb. 17, gage height 4.44 ft (1.353 m), only peak above base of 120 ft^3/s (3.40 m^3/s); minimum discharge, 0.16 ft^3/s (0.005 m^3/s) Aug. 26; minimum gage height, 1.41 ft (0.430 m) Aug. 6, 7, 8, 12, 13, 14, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	2.4	2.4	1.6	1.6	14	5.1	7.1	1.7	1.1	.34	2.1
2	2.4	2.2	14	1.5	1.6	10	4.4	5.8	1.6	1.1	.30	1.3
3	2.1	2.1	13	1.5	1.5	7.8	3.9	5.0	1.6	.99	.32	1.1
4	2.3	2.2	8.1	1.4	1.3	7.0	4.2	4.5	1.5	.97	.36	7.3
5	2.0	2.1	6.7	1.4	1.2	6.5	4.1	4.1	1.3	.87	.30	8.2
6	1.8	1.9	11	1.4	1.2	5.8	3.6	3.7	1.3	.76	.28	4.3
7	1.7	2.0	40	1.5	1.2	5.0	3.4	3.3	1.1	.68	.26	3.0
8	1.6	2.1	59	1.4	1.2	4.6	3.4	3.1	1.3	.61	.32	2.2
9	1.4	2.0	49	1.3	1.2	4.4	5.6	3.0	1.3	.59	.40	1.5
10	1.3	1.9	28	1.3	1.2	4.6	5.6	4.8	1.2	.55	.34	1.2
11	1.3	1.7	16	1.3	1.5	4.5	44	55	1.0	.50	.34	1.0
12	1.3	1.7	10	1.3	1.7	4.2	43	33	.95	.47	.28	.85
13	1.2	1.7	8.3	1.3	1.9	4.2	26	19	22	.50	.26	.74
14	1.2	1.7	6.8	1.3	2.2	3.7	68	13	18	.45	.30	.69
15	1.5	1.6	5.7	1.3	2.5	3.8	34	12	13	.43	.48	.64
16	1.8	1.5	4.8	1.3	24	3.7	21	9.1	7.0	.45	.26	.74
17	4.8	1.5	4.0	1.3	126	3.6	14	7.4	4.9	.44	.23	1.2
18	7.9	1.5	3.3	1.3	134	3.2	11	6.1	3.8	.39	.21	1.4
19	5.4	1.4	2.6	1.3	101	2.9	8.5	5.3	3.2	.38	.19	1.1
20	4.3	1.4	2.2	1.3	64	2.8	7.5	4.6	2.7	.43	.19	.95
21	3.7	1.4	2.0	1.3	42	2.7	6.3	4.0	2.5	.48	.18	2.2
22	3.1	1.4	1.9	1.3	36	2.7	5.7	3.5	3.2	.45	.18	17
23	2.7	1.4	1.8	1.3	43	2.7	15	3.3	2.6	.38	.18	7.9
24	2.6	1.5	1.7	1.3	34	2.8	14	3.2	2.3	.34	.18	4.8
25	3.5	1.4	1.6	1.4	25	2.7	10	3.4	2.0	.32	.19	3.7
26	3.6	1.3	1.5	2.3	19	4.6	7.9	3.1	1.6	.38	.16	3.7
27	3.2	1.4	1.5	3.5	14	7.6	6.7	2.9	1.4	.38	.25	8.2
28	3.0	1.7	1.5	3.3	16	6.2	6.4	2.7	1.2	.84	.44	5.7
29	2.7	1.8	1.5	2.8	---	5.3	9.4	2.5	1.1	.75	2.7	4.1
30	2.5	1.8	1.5	2.0	---	5.5	8.8	2.3	1.1	.46	12	15
31	2.5	---	1.6	1.7	---	5.6	---	2.0	---	.38	4.2	---
TOTAL	82.9	51.7	313.0	49.5	701.0	154.7	410.5	241.8	109.45	17.82	26.62	113.81
MEAN	2.67	1.72	10.1	1.60	25.0	4.99	13.7	7.80	3.65	.57	.86	3.79
MAX	7.9	2.4	59	3.5	134	14	68	55	22	1.1	12	17
MIN	1.2	1.3	1.5	1.3	1.2	2.7	3.4	2.0	.95	.32	.16	.64
CFSM	.29	.18	1.08	.17	2.68	.53	1.47	.84	.39	.06	.09	.41
IN.	.33	.21	1.25	.20	2.79	.62	1.63	.96	.44	.07	.11	.45

CAL YR 1980 TOTAL 2106.54 MEAN 5.76 MAX 74 MIN .36 CFSM .62 IN 8.39
WTR YR 1981 TOTAL 2272.80 MEAN 6.23 MAX 134 MIN .16 CFSM .67 IN 9.05

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW¼ sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi (6.4 km) upstream from Sycamore Creek, and 5.6 mi (9.0 km) upstream from mouth.

DRAINAGE AREA.--355 mi^2 (919 km^2).

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft (251.274 m) National Geodetic Vertical Datum of 1929. August 1902 to December 1903 nonrecording gage at site 0.8 mi (1.3 km) downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft (76 m) upstream at present datum.

REMARKS.--Records good. Prior to April 1975, occasional regulation at low flow by mill at Williamston, 16 mi (26 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 204 ft^3/s (5.777 m^3/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft^3/s (168 m^3/s) Apr. 20, 1975, gage height, 11.95 ft (3.642 m); minimum, 3 ft^3/s (0.08 m^3/s) July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft (4.08 m), discharge, 8,000 ft^3/s (277 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,710 ft^3/s (76.7 m^3/s) Feb. 20, gage height, 8.06 ft (2.457 m); minimum, 21 ft^3/s (0.59 m^3/s) Aug. 24-26, gage height, 3.12 ft (0.951 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	114	111	89	89	665	275	355	120	60	47	87
2	166	108	170	89	89	590	261	323	114	62	40	72
3	152	102	240	89	84	505	240	295	108	62	38	60
4	149	102	240	89	77	435	230	264	105	60	34	105
5	149	102	247	89	79	395	230	240	97	55	32	184
6	142	102	233	92	77	355	226	222	89	53	32	202
7	135	100	327	92	74	315	216	205	79	51	31	170
8	129	105	500	89	74	279	198	191	89	51	32	142
9	117	108	665	87	72	254	226	188	87	44	29	129
10	108	111	655	87	72	240	233	208	87	44	32	111
11	102	111	555	87	77	236	419	683	82	40	31	92
12	97	111	448	87	87	230	715	1060	74	38	29	74
13	92	111	395	84	105	226	770	960	163	36	29	65
14	97	108	347	79	111	219	1000	770	287	34	28	60
15	105	108	264	77	117	208	1060	655	250	34	32	55
16	114	108	219	77	132	205	880	580	198	32	32	62
17	142	105	156	74	466	198	670	510	152	34	31	65
18	177	105	180	74	1210	191	545	435	126	34	29	69
19	194	102	174	74	2100	177	453	375	105	32	28	72
20	170	100	114	74	2480	166	399	315	92	34	26	72
21	152	100	120	77	1900	160	335	264	89	34	23	72
22	142	100	117	77	1540	160	287	233	114	31	23	156
23	129	97	105	79	1370	152	319	205	111	32	23	198
24	120	97	97	82	1280	156	431	194	111	31	21	174
25	123	92	89	84	1140	156	453	208	105	29	21	149
26	126	92	87	89	970	177	423	212	92	32	21	132
27	129	89	87	97	825	240	403	198	82	32	28	135
28	129	92	84	108	730	268	383	188	74	55	36	142
29	126	97	84	111	---	264	379	170	67	60	60	132
30	123	102	84	100	---	264	383	149	62	62	129	168
31	117	---	87	87	---	272	---	132	---	57	123	---
TOTAL	4147	3081	7281	2670	17427	8358	13042	10987	3411	1345	1150	3406
MEAN	134	103	235	86.1	622	270	435	354	114	43.4	37.1	114
MAX	194	114	665	111	2480	665	1060	1060	287	62	129	202
MIN	92	89	84	74	72	152	198	132	62	29	21	55
CFSM	.38	.29	.66	.24	1.75	.76	1.23	1.00	.32	.12	.11	.32
IN.	.43	.32	.76	.28	1.83	.88	1.37	1.15	.36	.14	.12	.36

CAL YR 1980 TOTAL 75487 MEAN 206 MAX 1000 MIN 34 CFSM .58 IN 7.91
WTR YR 1981 TOTAL 76305 MEAN 209 MAX 2480 MIN 21 CFSM .59 IN 8.00

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW¼ sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft (9 m) upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi (3.2 km) downstream from Red Cedar River, and at mile 152 (245 km).

DRAINAGE AREA.--1,230 mi² (3,180 km²), approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft (245.526 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi (2.9 km) downstream at datum 2.42 ft (0.738 m) lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--52 years, 826 ft³/s (23.39 m³/s), 9.12 in/yr (232 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft³/s (694 m³/s) Mar. 26, 1904, gage height, 18.60 ft (5.669 m), datum then in use, from rating curve extended above 15,000 ft³/s (425 m³/s); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 9, 1963, gage height, 0.85 ft (0.259 m); minimum daily, 20 ft³/s (0.57 m³/s) Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,360 ft³/s (180 m³/s) Feb. 20, gage height, 11.06 ft (3.371 m); minimum, 61 ft³/s (1.73 m³/s) Feb. 9, gage height, 1.60 ft (0.488 m); minimum daily, 155 ft³/s (4.39 m³/s) July 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	821	538	539	570	468	2430	1130	1690	830	500	781	717
2	730	543	768	480	491	2230	1080	1630	888	434	546	592
3	709	777	980	530	517	2040	1050	1510	883	349	638	554
4	638	633	944	480	474	1880	1100	1390	852	429	646	827
5	660	574	993	444	470	1640	1020	1290	836	374	547	864
6	615	566	939	453	497	1680	1010	1220	606	358	446	930
7	567	552	1220	597	522	1520	1010	1120	773	361	457	865
8	534	570	1860	525	555	1410	955	1080	587	395	493	860
9	547	556	2060	502	411	1320	1140	1010	645	457	424	777
10	504	502	2150	494	450	1280	1050	1180	825	432	547	610
11	518	448	1910	512	540	1260	1650	2530	408	313	334	593
12	491	525	1800	476	470	1190	2440	2680	648	362	309	523
13	457	394	1590	476	580	1190	2450	2490	1130	331	298	423
14	531	502	1440	440	590	1110	4020	2300	1550	215	305	377
15	425	444	1190	448	531	1090	3460	2000	1370	271	311	400
16	448	484	1090	458	877	1010	2800	1850	1050	351	254	422
17	633	354	934	394	1580	892	2670	1700	1020	346	236	386
18	628	376	926	435	3300	913	2070	1550	966	270	294	472
19	678	430	957	462	5060	832	2020	1390	678	196	244	443
20	660	538	710	408	6130	804	1660	1350	727	155	213	471
21	705	448	628	480	5770	931	1710	1110	889	288	252	563
22	588	417	610	525	4830	698	1580	1180	801	228	270	766
23	584	399	620	584	4160	807	1830	1040	869	410	220	684
24	561	476	754	462	3720	862	2030	1010	826	351	241	800
25	628	417	512	512	3470	750	2110	1020	795	342	179	662
26	592	407	556	534	3020	932	2100	1030	798	281	204	642
27	692	461	489	484	2780	930	1940	1020	570	335	276	808
28	696	495	534	610	2560	1100	1800	959	628	494	332	701
29	651	515	579	553	---	961	1730	860	605	539	404	653
30	566	484	525	586	---	1060	1800	817	436	697	790	1070
31	628	---	516	492	---	1140	---	835	---	646	770	---
TOTAL	18685	14825	31323	15406	54823	37892	54415	43841	24489	11510	12261	19455
MEAN	603	494	1010	497	1958	1222	1814	1414	816	371	396	649
MAX	821	777	2150	610	6130	2430	4020	2680	1550	697	790	1070
MIN	425	354	489	394	411	698	955	817	408	155	179	377
CFSM	.49	.40	.82	.40	1.59	.99	1.48	1.15	.66	.30	.32	.53
IN.	.57	.45	.95	.47	1.66	1.15	1.65	1.33	.74	.35	.37	.59

CAL YR 1980 TOTAL 325375 MEAN 889 MAX 2900 MIN 233 CFSM .72 IN 9.84
WTR YR 1981 TOTAL 338925 MEAN 929 MAX 6130 MIN 155 CFSM .76 IN 10.25

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'20", long 84°54'45", in NW¼ sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi (1.6 km) south of Portland, 1.9 mi (3.1 km) upstream from Looking Glass River, and at mile 115 (185 km).

DRAINAGE AREA.--1,385 mi² (3,587 km²).

PERIOD OF RECORD.--August 1952 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft (214.884 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight diurnal fluctuation caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--29 years, 909 ft³/s (25.74 m³/s), 8.91 in/yr (226 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft³/s (351 m³/s) Apr. 21, 1975, gage height, 12.98 ft (3.956 m); minimum, 38 ft³/s (1.08 m³/s) Oct. 10, 1963; minimum daily, 58 ft³/s (1.64 m³/s) Oct. 9, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,740 ft³/s (191 m³/s) Feb. 21, gage height, 10.51 ft (3.203 m); minimum, 189 ft³/s (5.35 m³/s) Aug. 24, gage height, 4.42 ft (1.347 m); minimum daily, 236 ft³/s (6.68 m³/s) Aug. 26.

DISCHARGE. IN CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	858	688	576	570	544	2760	1260	1970	919	495	654	838
2	788	612	729	600	514	2590	1210	1800	879	540	808	815
3	760	619	1000	540	559	2380	1180	1740	971	404	624	648
4	767	813	1160	580	540	2160	1170	1580	932	416	698	714
5	678	696	1060	540	540	2020	1190	1510	895	470	679	954
6	684	642	1100	500	560	1790	1070	1350	847	428	586	974
7	672	627	1230	520	600	1780	1080	1280	654	480	502	990
8	640	631	2020	660	600	1620	1050	1170	785	398	510	924
9	599	635	2860	600	588	1490	1180	1140	677	443	544	917
10	611	617	2670	560	496	1410	1220	1140	679	491	479	820
11	575	580	2420	560	530	1390	1570	3280	831	477	585	674
12	579	531	2140	560	550	1330	2900	4260	473	384	409	648
13	552	592	1950	540	600	1290	3180	3480	713	388	380	583
14	540	495	1760	530	660	1270	4560	3010	1650	401	364	498
15	627	581	1490	500	678	1170	4630	2610	1750	313	383	459
16	542	522	1320	500	621	1170	3860	2290	1590	295	381	479
17	583	554	1170	500	1870	1070	3220	2070	1150	398	323	547
18	788	469	938	400	3640	893	2780	1860	1140	419	280	499
19	724	444	1050	450	5270	1010	2330	1730	911	344	356	549
20	749	522	1000	500	6210	888	2180	1510	792	275	317	517
21	731	608	947	460	6540	883	1900	1400	753	247	275	546
22	829	534	761	530	5640	1000	1830	1270	987	345	295	892
23	652	505	700	556	4930	705	2060	1260	849	288	330	806
24	643	492	680	606	4360	911	2260	1130	890	451	256	693
25	698	565	750	526	3960	890	2390	1180	853	411	319	876
26	723	513	600	572	3550	851	2370	1310	832	453	236	778
27	669	515	600	590	3130	1150	2280	1300	791	382	286	973
28	760	568	560	532	3040	1060	2070	1250	598	451	431	994
29	764	606	600	668	---	1180	2020	1080	656	605	478	833
30	717	603	640	596	---	1110	1960	951	622	589	600	869
31	561	---	600	610	---	1240	---	896	---	689	878	---
TOTAL	21063	17379	37081	16956	61320	42461	63960	53807	27069	13170	14246	22307
MEAN	679	579	1196	547	2190	1370	2132	1736	902	425	460	744
MAX	858	813	2860	668	6540	2760	4630	4260	1750	689	878	994
MIN	540	444	560	400	496	705	1050	896	473	247	236	459
CFSM	.49	.42	.86	.40	1.58	.99	1.54	1.25	.65	.31	.33	.54
IN.	.57	.47	1.00	.46	1.65	1.14	1.72	1.45	.73	.35	.38	.60

CAL YR 1980 TOTAL 362576 MEAN 991 MAX 3200 MIN 245 CFSM .72 IN 9.74
WTR YR 1981 TOTAL 390819 MEAN 1071 MAX 6540 MIN 236 CFSM .77 IN 10.50

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of former bridge site, 1.5 mi (2.4 km) northeast of Eagle and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--281 mi^2 (728 km^2).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft (227.713 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft^3/s (1.42 m^3/s). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 170 ft^3/s (4.814 m^3/s), 8.22 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft^3/s (81.0 m^3/s) Apr. 5, 1947, gage height, 7.70 ft (2.347 m), from graph based on gage readings, from rating curve extended above 1,900 ft^3/s (53.8 m^3/s); maximum gage height, 9.9 ft (3.02 m) Mar. 7, 1956, from high-water mark, backwater from ice; minimum discharge, 10 ft^3/s (0.28 m^3/s) July 28, 1965, gage height, 1.01 ft (0.308 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,500 ft^3/s (42.5 m^3/s) Feb. 19, gage height, 6.47 ft (1.972 m), backwater from ice; minimum, 26 ft^3/s (0.74 m^3/s) Aug. 25, 26, gage height, 1.35 ft (0.411 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	84	79	77	72	74	794	197	364	189	67	50	57
2	79	79	108	72	74	745	195	337	166	64	46	62
3	73	77	107	72	70	682	198	315	146	60	42	57
4	72	78	111	74	66	622	202	296	129	62	39	64
5	72	76	108	74	64	567	200	278	114	62	37	73
6	70	74	125	74	64	517	193	257	104	60	36	74
7	71	73	206	74	62	469	186	233	95	58	34	76
8	71	75	310	72	60	427	178	210	99	54	33	83
9	66	75	328	70	60	391	190	189	106	53	34	83
10	65	74	260	70	60	357	188	226	103	52	36	78
11	61	73	232	70	62	326	254	835	104	50	34	72
12	58	75	210	70	70	297	348	759	101	48	34	63
13	55	75	220	70	80	273	401	531	117	48	34	57
14	54	75	220	68	90	249	520	476	167	45	34	53
15	57	74	210	64	100	232	547	497	194	43	36	49
16	63	73	190	62	110	215	486	537	169	44	36	48
17	71	72	150	60	540	201	494	568	167	43	34	55
18	80	71	130	60	1150	187	530	590	172	41	32	61
19	77	70	140	62	1080	175	574	593	175	41	32	61
20	76	69	110	62	554	166	615	572	169	40	31	64
21	81	69	95	62	518	157	633	533	156	42	30	67
22	88	68	95	64	558	149	627	486	145	41	30	88
23	89	69	85	66	664	141	664	437	129	41	29	85
24	90	69	80	68	750	137	633	393	114	42	28	83
25	103	69	75	70	786	134	566	358	106	39	27	88
26	97	69	70	72	804	147	505	365	97	45	28	101
27	91	70	70	78	808	157	463	313	89	42	32	152
28	86	71	70	86	822	154	432	270	82	49	40	116
29	83	73	70	90	---	158	410	244	76	55	54	106
30	82	74	70	85	---	175	394	228	70	55	54	141
31	81	---	70	75	---	191	---	209	---	52	53	---
TOTAL	2346	2188	4402	2188	10200	9592	12031	12499	3850	1538	1129	2317
MEAN	75.7	72.9	142	70.6	364	309	401	403	128	49.6	36.4	77.2
MAX	103	79	328	90	1150	794	664	835	194	67	54	152
MIN	54	68	70	60	60	134	178	189	70	39	27	48
CFSM	.27	.26	.51	.25	1.30	1.10	1.43	1.43	.46	.18	.13	.28
IN.	.31	.29	.58	.29	1.35	1.27	1.59	1.65	.51	.20	.15	.31

CAL YR 1980 TOTAL 46145 MEAN 126 MAX 443 MIN 32 CFSM .45 IN 6.11
WTR YR 1981 TOTAL 64280 MEAN 176 MAX 1150 MIN 27 CFSM .63 IN 8.51

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft (15 m) upstream from Pine Creek, and 0.8 mi (1.3 km) upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi² (1,124 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft (195.858 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 250 ft³/s (7.080 m³/s), 7.82 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft³/s (184 m³/s) Mar. 20, 1948; maximum gage height, 11.22 ft (3.420 m) Mar. 20, 1948, from floodmark, backwater from ice; minimum discharge, 4.4 ft³/s (0.12 m³/s) Aug. 13, 1965, gage height, 1.62 ft (0.494 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft (4.21 m), from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,720 ft³/s (77.0 m³/s) Feb. 21, gage height, 9.24 ft (2.816 m); minimum, 14 ft³/s (0.40 m³/s) Aug. 25-27, gage height, 1.74 ft (0.530 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	262	313	93	92	82	1270	206	359	210	101	66	52
2	235	293	103	92	80	1200	212	346	181	93	52	49
3	218	273	115	92	80	1110	206	331	156	85	44	45
4	258	270	125	92	78	984	198	313	137	90	38	47
5	317	256	136	92	76	886	199	280	118	94	36	59
6	334	236	148	92	74	797	192	261	104	81	32	70
7	327	220	181	92	74	716	179	237	92	69	28	74
8	308	208	304	92	74	645	169	217	94	60	28	74
9	291	193	565	92	74	581	186	198	111	55	26	67
10	269	182	911	92	74	536	214	210	112	49	24	59
11	246	186	1090	92	76	494	265	556	107	44	24	53
12	225	177	1090	92	78	454	354	1440	97	40	24	48
13	207	165	1000	90	80	423	448	1930	94	40	23	43
14	190	155	905	88	84	392	577	2010	194	39	23	39
15	170	147	806	86	90	366	763	1890	580	38	28	33
16	174	139	707	84	100	347	855	1710	727	38	30	32
17	193	132	613	84	205	324	866	1490	732	36	28	46
18	272	125	543	82	662	301	834	1270	666	34	24	73
19	365	124	460	82	1430	278	769	1080	586	33	22	85
20	412	121	397	82	2370	257	701	926	514	32	20	80
21	428	114	345	82	2710	240	625	801	471	31	18	78
22	426	109	300	82	2590	225	561	696	425	31	17	84
23	413	103	258	82	2390	209	522	607	382	31	16	95
24	393	99	224	84	2190	197	498	536	340	31	16	110
25	384	95	200	86	1960	187	481	475	296	28	15	125
26	386	92	171	86	1720	181	460	422	255	27	14	140
27	389	89	145	88	1580	187	434	381	218	31	15	250
28	384	87	123	90	1330	190	405	342	179	47	22	400
29	372	86	110	88	---	193	377	303	138	87	40	600
30	353	88	100	86	---	198	367	270	114	106	55	1000
31	333	---	95	84	---	207	---	239	---	87	55	---
TOTAL	9543	4877	12363	2720	22331	14575	13123	22126	8430	1688	903	4010
MEAN	308	163	399	87.7	798	470	437	714	281	54.5	29.1	134
MAX	428	313	1090	92	2710	1270	866	2010	732	106	66	1000
MIN	174	86	93	82	74	181	169	198	92	27	14	32
CFSM	.71	.38	.92	.20	1.84	1.08	1.01	1.65	.65	.13	.07	.31
IN.	.82	.42	1.06	.23	1.91	1.25	1.12	1.90	.72	.14	.08	.34

CAL YR 1980 TOTAL 91746 MEAN 251 MAX 1090 MIN 28 CFSM .58 IN 7.86
WTR YR 1981 TOTAL 116689 MEAN 320 MAX 2710 MIN 14 CFSM .74 IN 10.00

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW¼ sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft (5 m) downstream from bridge on State Highway 66 at Ionia, 2.7 mi (4.3 km) downstream from Prairie Creek, and at mile 87 (140 km).

DRAINAGE AREA.--2,840 mi^2 (7,360 km^2), approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft (187.568 m) National Geodetic Vertical Datum of 1929. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below about 5,000 ft^3/s (142 m^3/s) caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--30 years (water years 1952-81), 1,856 ft^3/s (52.56 m^3/s), 8.87 in/yr (225 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft^3/s (609 m^3/s) Apr. 1, 1960, gage height, 23.43 ft (7.141 m); minimum, 40 ft^3/s (1.13 m^3/s) May 13, 1968, gage height, 5.61 ft (1.710 m); minimum daily, 109 ft^3/s (3.09 m^3/s) July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,200 ft^3/s (346 m^3/s) Feb. 22, gage height, 20.14 ft (6.139 m); minimum, 232 ft^3/s (6.57 m^3/s) Aug. 22, gage height, 6.77 ft (2.063 m); minimum daily, 379 ft^3/s (10.7 m^3/s) Aug. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1560	1410	949	1200	1100	6650	2140	3390	1810	1330	924	1170
2	1440	1420	1160	1100	1000	6190	2120	3260	1700	812	961	1050
3	1500	1360	1500	1200	950	5720	2020	3050	1740	724	1020	1080
4	1500	1480	1670	1000	1000	5190	1940	2900	1670	894	1010	827
5	1480	1380	1780	900	1050	4710	2060	2660	1660	945	811	1300
6	1410	1450	1760	950	1100	4280	1890	2610	1490	804	860	1360
7	1460	1220	2030	1000	1100	3870	1990	2250	1250	906	736	1040
8	1330	1200	3200	1100	1150	3740	1810	2130	1320	838	709	1380
9	1340	1270	4820	1300	1150	3400	1910	2050	1490	549	707	1110
10	1220	1210	5060	1200	1100	3140	2100	2130	1250	550	705	1230
11	1150	1120	4710	1100	1000	2870	2390	4570	1280	940	695	1050
12	1170	1250	4330	1100	950	2840	3810	8620	1370	790	695	994
13	1130	1060	4030	1000	1000	2710	4990	9910	1140	729	676	872
14	1110	1030	3560	1000	1100	2560	5490	9310	1970	491	390	774
15	1080	1020	3100	1000	1300	2460	7190	8150	3590	710	668	652
16	1290	1110	2910	950	1600	2300	7060	7030	3690	478	438	716
17	1250	986	2590	950	2330	2270	6420	6140	3320	687	677	803
18	1400	971	2430	950	6200	2090	5680	5490	2990	433	421	774
19	1570	957	2210	950	10200	2010	4990	4850	2880	703	426	944
20	1550	946	2000	950	11500	1980	4630	4310	2150	447	690	919
21	1600	941	1700	950	12100	1680	4140	3910	2120	516	390	821
22	1670	932	1500	970	11800	1810	3870	3520	2520	503	379	966
23	1580	925	1400	1000	10700	1680	3970	3030	2160	733	402	1490
24	1540	925	1300	1100	9860	1630	4420	2950	2140	449	401	1360
25	1540	920	1500	1000	9110	1780	4360	2930	1860	705	626	1190
26	1550	911	1300	1050	8350	1740	4160	2730	1750	462	390	1460
27	1590	901	1200	1100	7540	1390	4000	2700	1610	735	492	2150
28	1610	912	1200	1100	6930	2100	3850	2620	1570	794	636	2410
29	1770	1040	1100	1100	---	1780	3660	2380	1330	978	956	1950
30	1590	1200	1200	1100	---	2080	3590	2030	1260	929	1010	2190
31	1450	---	1300	1100	---	1860	---	1950	---	940	1190	---
TOTAL	44430	33457	70499	32470	124270	90510	112650	125560	58080	22504	21091	36032
MEAN	1433	1115	2274	1047	4438	2920	3755	4050	1936	726	680	1201
MAX	1770	1480	5060	1300	12100	6650	7190	9910	3690	1330	1190	2410
MIN	1080	901	949	900	950	1390	1810	1950	1140	433	379	652
CFSM	.51	.39	.80	.37	1.56	1.03	1.32	1.43	.68	.26	.24	.42
IN.	.58	.44	.92	.43	1.63	1.19	1.48	1.64	.76	.29	.28	.47

CAL YR 1980 TOTAL 643739 MEAN 1759 MAX 5140 MIN 453 CFSM .62 IN 8.43
WTR YR 1981 TOTAL 771553 MEAN 2114 MAX 12100 MIN 379 CFSM .74 IN 10.11

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW¼ sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, and 0.5 mi (0.8 km) south of Smyrna.

DRAINAGE AREA.--528 mi² (1,368 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft (222.361 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 428 ft³/s (12.12 m³/s), 11.01 in/yr (280 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft³/s (87.8 m³/s) Apr. 22, 1967, gage height, 7.27 ft (2.216 m), caused by momentary release of water from storage above station; maximum gage height, 8.26 ft (2.518 m) Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft³/s (0.21 m³/s) Sept. 9, 1953; minimum daily, 70 ft³/s (1.98 m³/s) Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,690 ft³/s (47.9 m³/s) Sept. 30, stage rising, peak occurred Oct. 2, 1981; maximum peak discharge, 1,240 ft³/s (35.1 m³/s) Feb. 22, 24, May 14; maximum gage height, 6.95 ft (2.118 m) Feb. 3, backwater from ice; minimum discharge, 59 ft³/s (1.67 m³/s) Nov. 5, gage height, 2.86 ft (0.872 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	320	305	345	270	260	910	480	512	331	307	212	367
2	316	304	380	270	260	866	486	495	294	240	203	327
3	300	302	332	270	260	789	559	477	297	249	216	242
4	304	323	435	260	250	737	526	462	292	247	218	210
5	296	277	399	260	250	688	465	452	287	268	210	189
6	292	327	411	250	250	599	436	426	330	276	206	190
7	284	350	516	250	250	602	430	373	326	271	202	234
8	254	360	591	250	250	580	427	363	318	229	253	248
9	269	331	740	250	250	500	509	359	338	211	203	245
10	225	321	754	250	250	458	511	450	354	206	200	231
11	236	303	663	250	250	462	640	1050	350	203	142	175
12	232	301	725	250	260	459	722	1170	324	203	172	168
13	232	297	685	250	270	488	874	1200	303	183	149	168
14	240	316	609	250	280	477	910	1200	457	172	150	217
15	243	316	577	250	290	465	892	1090	571	216	171	212
16	269	344	470	250	310	441	904	950	752	226	164	202
17	356	379	389	250	386	435	955	880	618	220	198	255
18	372	367	360	250	509	427	855	771	516	212	215	322
19	364	346	340	250	724	416	776	698	468	208	232	348
20	368	307	310	250	869	404	741	601	417	206	184	298
21	399	307	300	250	998	387	675	556	527	217	168	253
22	383	303	290	260	1140	357	629	479	508	203	155	285
23	370	312	280	260	1170	366	603	420	492	156	138	277
24	366	344	270	260	1180	368	599	450	452	146	137	320
25	356	346	270	260	1140	368	588	468	426	166	137	279
26	356	337	270	270	1100	380	575	453	396	202	134	320
27	360	332	260	270	995	390	561	538	375	203	178	367
28	384	332	260	280	957	394	564	385	345	252	240	337
29	357	335	260	270	---	407	589	369	327	265	378	447
30	334	340	270	270	---	469	563	409	317	237	376	560
31	306	---	270	270	---	471	---	391	---	223	360	---
TOTAL	9743	9764	13031	8000	15358	15560	19044	18897	12108	6823	6301	8293
MEAN	314	325	420	258	549	502	635	610	404	220	203	276
MAX	399	379	754	280	1180	910	955	1200	752	307	378	560
MIN	225	277	260	250	250	357	427	359	287	146	134	168
CFSM	.60	.62	.80	.49	1.04	.95	1.20	1.16	.77	.42	.38	.52
IN.	.69	.69	.92	.56	1.08	1.10	1.34	1.33	.85	.48	.44	.58

CAL YR 1980 TOTAL 135052 MEAN 369 MAX 1070 MIN 152 CFSM .70 IN 9.52
WTR YR 1981 TOTAL 142922 MEAN 392 MAX 1200 MIN 134 CFSM .74 IN 10.07

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE¼ sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi (1.0 km) downstream from Cedar Creek, 2.0 mi (3.2 km) downstream from Thornapple Lake, and 3.2 mi (5.1 km) southeast of Hastings.

DRAINAGE AREA.--385 mi² (997 km²).

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft (239.789 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--37 years, 311 ft³/s (8.808 m³/s), 10.97 in/yr (279 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,810 ft³/s (193 m³/s) Apr. 7, 1947, gage height, 10.20 ft (3.109 m), from graph based on gage readings; minimum, 33 ft³/s (0.93 m³/s) Aug. 10, 1964, gage height, 2.71 ft (0.826 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,610 ft³/s (73.9 m³/s) Feb. 21, gage height, 7.29 ft (2.222 m); minimum, 88 ft³/s (2.49 m³/s) Aug. 25, 26, gage height, 2.94 ft (0.896 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	217	217	205	184	200	899	350	625	289	172	182	344
2	200	208	257	185	197	812	342	586	257	169	160	304
3	190	199	335	180	181	744	314	525	242	167	156	276
4	185	200	400	170	178	671	289	460	231	166	157	250
5	181	206	428	167	178	603	284	410	217	165	151	228
6	175	202	418	166	175	540	269	373	207	159	142	208
7	171	200	457	175	175	488	250	336	194	153	134	191
8	165	204	600	178	175	440	234	307	184	144	126	177
9	159	199	810	168	172	408	251	285	194	144	126	165
10	152	199	986	171	172	390	283	310	194	138	129	153
11	148	195	1040	168	188	373	433	571	188	132	130	144
12	144	187	1000	165	200	360	748	1010	178	128	127	144
13	144	181	932	163	200	349	1060	1390	225	173	121	139
14	145	181	805	164	210	335	1440	1570	392	206	119	132
15	158	181	660	170	210	317	1710	1520	567	184	122	125
16	175	180	505	173	228	310	1790	1340	666	162	124	123
17	199	177	356	175	397	297	1670	1120	672	147	120	127
18	230	174	313	178	944	285	1470	893	592	133	113	128
19	261	171	270	176	1800	268	1260	694	472	127	107	125
20	271	169	204	178	2440	257	1080	548	368	133	102	125
21	261	167	187	181	2580	250	879	450	302	169	99	127
22	244	168	186	181	2380	247	723	385	316	178	96	145
23	224	168	189	184	2060	243	691	337	333	165	91	162
24	210	171	187	188	1790	236	765	313	311	151	91	163
25	215	175	169	188	1550	233	832	330	276	133	90	158
26	235	174	164	194	1350	248	835	420	242	158	90	165
27	256	175	168	207	1170	325	783	490	217	196	123	220
28	259	177	164	214	1020	378	697	500	197	216	157	306
29	248	185	171	214	---	387	647	442	182	253	203	341
30	236	193	173	191	---	373	634	379	178	246	328	367
31	223	---	180	181	---	373	---	325	---	214	391	---
TOTAL	6281	5583	12919	5577	22520	12439	23013	19244	9083	5181	4407	5762
MEAN	203	186	417	180	804	401	767	621	303	167	142	192
MAX	271	217	1040	214	2580	899	1790	1570	672	253	391	367
MIN	144	167	164	163	172	233	234	285	178	127	90	123
CFSM	.53	.48	1.08	.47	2.09	1.04	1.99	1.61	.79	.43	.37	.50
IN.	.61	.54	1.25	.54	2.18	1.20	2.22	1.86	.88	.50	.43	.56

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CAL YR 1980   TOTAL   117689   MEAN 322   MAX  1090   MIN 123   CFSM .84   IN 11.37
WTR YR 1981   TOTAL   132009   MEAN 362   MAX  2580   MIN  90   CFSM .94   IN 12.76
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04118000 THORNAPPLE RIVER NEAR CALEDONIA, MI

LOCATION.--Lat 42°48'40", long 85°29'00", in NW¼ sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft (61 m) downstream from LaBarge powerplant, 2.3 mi (3.7 km) northeast of Caledonia, and 3.3 mi (5.3 km) downstream from Coldwater River.

DRAINAGE AREA.--773 mi^2 (2,002 km^2).

PERIOD OF RECORD.--October 1930 to September 1938, October 1951 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1931-36. WSP 1307: 1931-37.

GAGE.--Water-stage recorder. Datum of gage is 676.31 ft (206.139 m) Consumers Power Co. datum. Oct. 1, 1930 to Sept. 30, 1938, nonrecording gage at same site and at National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 1, 1958, large diurnal fluctuation at low and medium flow caused by powerplant above station; occasional fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 577 ft^3/s (16.34 m^3/s), 10.14 in/yr (258 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,290 ft^3/s (178 m^3/s) May 10, 1956, gage height, 10.79 ft (3.289 m); maximum gage height, 10.96 ft (3.341 m) Apr. 22, 1975; minimum discharge, 1.0 ft^3/s (0.028 m^3/s) May 28, 1968, gage height, 1.40 ft (0.427 m), result of regulation during bridge construction.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1947, reached a stage of 14.4 ft (4.39 m) from information by powerplant operator.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,250 ft^3/s (120 m^3/s) Feb. 22, gage height, 8.94 ft (2.725 m); minimum, 184 ft^3/s (5.21 m^3/s) Aug. 26, gage height, 2.91 ft (0.887 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	470	456	480	410	464	1690	741	1160	676	436	490	703
2	432	442	597	410	470	1500	700	1110	622	358	435	631
3	423	429	681	400	405	1330	667	1040	699	433	406	568
4	414	437	730	390	400	1230	676	951	678	417	400	524
5	374	461	777	380	400	1140	628	875	607	404	388	484
6	410	448	802	380	400	1040	595	815	553	309	379	454
7	369	453	983	390	390	950	563	753	505	362	374	427
8	365	454	1320	390	390	883	538	696	495	347	297	414
9	361	438	1690	380	390	837	584	658	507	338	328	390
10	347	450	1780	380	400	800	609	716	493	404	352	375
11	347	415	1780	370	420	770	1000	1800	474	281	336	364
12	352	437	1770	370	450	742	1540	2980	460	274	335	352
13	347	404	1650	370	460	725	1850	3030	633	437	375	292
14	331	417	1510	380	470	691	2640	3060	949	380	286	321
15	352	416	1250	380	480	664	3310	3020	1280	412	370	312
16	392	411	1100	390	618	658	3280	2820	1320	404	353	407
17	442	405	906	390	1190	634	3140	2160	1270	324	332	428
18	525	406	804	390	2030	609	2850	1810	1170	328	246	347
19	555	401	656	390	3090	582	2340	1510	1020	316	364	409
20	555	400	593	400	3710	561	1930	1230	854	323	221	385
21	550	399	580	400	4070	548	1700	1050	745	412	269	290
22	525	396	520	410	4190	532	1440	904	706	430	269	414
23	466	403	450	420	4000	520	1560	815	698	436	265	408
24	470	418	400	430	3550	508	1620	760	676	337	264	403
25	490	424	380	440	3090	502	1600	731	631	349	318	400
26	500	425	370	460	2590	549	1550	853	569	397	209	441
27	515	433	370	460	2050	649	1460	923	516	526	283	707
28	507	439	370	466	1840	692	1340	933	470	601	383	789
29	506	449	380	460	---	723	1280	899	442	715	459	805
30	511	457	390	465	---	744	1200	825	447	651	595	934
31	470	---	400	499	---	765	---	747	---	573	680	---
TOTAL	13673	12823	26469	12650	42407	24768	44931	41634	21165	12714	11061	14178
MEAN	441	427	854	408	1515	799	1498	1343	706	410	357	473
MAX	555	461	1780	499	4190	1690	3310	3060	1320	715	680	934
MIN	331	396	370	370	390	502	538	658	442	274	209	290
CFSM	.57	.55	1.11	.53	1.96	1.03	1.94	1.74	.91	.53	.46	.61
IN.	.66	.62	1.27	.61	2.04	1.19	2.16	2.00	1.02	.61	.53	.68

CAL YR 1980 TOTAL 238110 MEAN 651 MAX 1840 MIN 300 CFSM .84 IN 11.46
WTR YR 1981 TOTAL 278473 MEAN 763 MAX 4190 MIN 209 CFSM .99 IN 13.40

04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°05'00", long 85°35'30", in NE¼ sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of highway bridge, 2.2 mi (3.5 km) upstream from mouth, and 3.0 mi (4.8 km) southwest of Rockford.

DRAINAGE AREA.--234 mi² (606 km²).

PERIOD OF RECORD.--February 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 624.80 ft (190.439 m) National Geodetic Vertical Datum of 1929 (levels by Johnson and Anderson, Inc.). Prior to Aug. 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 228 ft³/s (6.457 m³/s), 13.23 in/yr (336 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,540 ft³/s (100 m³/s) Mar. 6, 1976, gage height, 9.29 ft (2.832 m); minimum, 28 ft³/s (0.79 m³/s) Jan. 22, 1967, gage height, 3.41 ft (1.039 m); minimum daily, 49 ft³/s (1.39 m³/s) Aug. 27, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,090 ft³/s (30.9 m³/s) Sept. 30, stage rising, peak occurred Oct. 2, 1981; maximum peak discharge, 1,000 ft³/s (28.3 m³/s) Feb. 22, gage height, 7.04 ft (2.146 m); minimum discharge, 88 ft³/s (2.49 m³/s) Aug. 21, 22, 23, 25, 26; minimum gage height, 3.73 ft (1.137 m) Aug. 21, 22, 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	234	201	212	175	170	456	271	260	208	171	121	175
2	218	194	235	170	170	420	274	253	202	178	115	154
3	206	190	229	165	170	379	270	242	199	181	131	144
4	198	208	244	165	170	369	277	229	194	175	124	137
5	194	203	233	160	165	337	249	224	190	164	122	130
6	194	205	244	160	165	314	230	215	183	156	117	126
7	192	209	371	160	165	293	217	208	176	149	113	123
8	186	210	423	160	165	279	210	204	242	144	111	124
9	180	208	508	160	165	267	301	200	258	140	111	121
10	176	201	550	160	170	258	277	293	257	134	109	120
11	173	194	474	160	175	250	403	676	240	129	107	115
12	167	189	429	155	180	245	459	704	213	128	103	112
13	164	186	368	155	185	241	480	745	208	130	100	109
14	167	202	311	155	195	234	578	620	334	129	101	107
15	171	198	280	155	200	233	672	498	310	127	122	105
16	188	201	258	155	209	227	602	416	322	125	115	118
17	214	206	244	155	237	222	508	361	305	121	112	150
18	216	208	223	155	366	216	426	323	285	120	107	150
19	222	208	200	160	571	211	373	296	253	118	100	145
20	228	204	190	160	898	206	339	270	231	121	94	133
21	232	200	185	160	952	204	309	251	332	125	91	135
22	224	194	180	160	934	205	288	235	322	126	90	150
23	218	195	175	165	809	205	302	225	285	115	89	142
24	214	195	175	165	741	204	307	233	256	111	91	137
25	226	192	170	170	690	202	306	257	235	109	89	136
26	216	190	165	175	624	215	302	249	210	108	91	186
27	217	194	165	185	512	220	295	256	192	106	95	184
28	217	196	165	180	498	222	287	248	178	139	134	173
29	215	199	170	180	---	228	287	231	171	147	191	166
30	213	202	175	175	---	260	269	221	171	146	202	289
31	209	---	180	175	---	263	---	213	---	134	187	---
TOTAL	6289	5982	8131	5090	10651	8085	10368	9856	7162	4206	3585	4296
MEAN	203	199	262	164	380	261	346	318	239	136	116	143
MAX	234	210	550	185	952	456	672	745	334	181	202	289
MIN	164	186	165	155	165	202	210	200	171	106	89	105
CFSM	.87	.85	1.12	.70	1.62	1.12	1.48	1.36	1.02	.58	.50	.61
IN.	1.00	.95	1.29	.81	1.69	1.29	1.65	1.57	1.14	.67	.57	.68

CAL YR 1980 TOTAL 85546 MEAN 234 MAX 721 MIN 103 CFSM 1.00 IN 13.60
WTR YR 1981 TOTAL 83701 MEAN 229 MAX 952 MIN 89 CFSM .98 IN 13.31

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE¼ sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft (152 m) upstream from bridge on Fulton Street, 1.7 mi (2.7 km) upstream from Plaster Creek, and at mile 41 (66 km).

DRAINAGE AREA.--4,900 mi^2 (12,700 km^2), approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft (178.521 m) National Geodetic Vertical Datum of 1929 (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft (152 m) downstream and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi (1.6 km) downstream at datum 2.99 ft (0.911 m) higher.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Mar. 31 to May 12, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--55 years, 3,536 ft^3/s (100.1 m^3/s), 9.80 in/yr (249 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54,000 ft^3/s (1,530 m^3/s) Mar. 28, 1904, gage height, 19.5 ft (5.94 m), from graph based on gage readings, site then in use; minimum daily, 381 ft^3/s (10.8 m^3/s) Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft^3/s (1,530 m^3/s) Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,300 ft^3/s (490 m^3/s) Feb. 23, gage height, 15.34 ft (4.676 m); minimum, 994 ft^3/s (28.2 m^3/s) Aug. 23, gage height, 2.74 ft (0.835 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3060	2690	2330	2300	2320	11600	4100	6200	3590	2320	1910	2360
2	2820	2580	2330	2200	2040	10600	4000	6000	3220	2230	1840	2320
3	2630	2560	2610	2300	2030	9800	4000	5600	3050	1930	1820	2140
4	2590	2550	2850	2100	2000	9040	3900	5200	3150	1850	1850	2060
5	2560	2660	3360	1900	2070	8290	3800	4800	2960	1910	1840	1870
6	2520	2580	3560	2000	2100	7530	3700	4600	2800	1880	1680	2130
7	2490	2610	4520	2100	2100	6810	3600	4200	2600	1750	1640	2120
8	2490	2390	5550	2200	2100	6290	3500	3900	2630	1860	1580	1950
9	2350	2420	6990	2300	2200	6000	3700	3700	2790	1780	1500	2080
10	2320	2400	7950	2200	2200	5620	4000	4500	2800	1500	1500	1970
11	2230	2310	8100	2100	2200	5270	5000	9000	2520	1480	1480	1950
12	2170	2230	7720	2100	2200	5030	6500	12000	2510	1660	1430	1790
13	2180	2260	7360	2000	2200	4930	9000	12900	2700	1820	1430	1640
14	2170	2220	6870	2000	2200	4780	11000	13500	3290	1670	1400	1570
15	2160	2160	6110	2000	2200	4630	12000	14000	5120	1360	1250	1490
16	2260	2140	5480	2000	2700	4490	12000	13600	6200	1450	1390	1550
17	2550	2160	4730	2000	2830	4340	11500	12400	6220	1350	1240	1810
18	2730	2120	4670	2000	5440	4170	11000	11000	5770	1480	1300	1810
19	2860	2090	3900	2000	8620	3970	10000	9560	5240	1310	1180	1710
20	2980	2030	3600	2000	12200	3830	9000	8230	4900	1430	1170	1840
21	3020	1990	3400	2000	15700	3730	8000	7050	4330	1360	1270	1850
22	3060	1980	3100	2100	16600	3400	7000	6270	4320	1400	1120	1800
23	3440	1970	2900	2100	17200	3380	7400	5610	4390	1410	1050	1890
24	3180	1960	2700	2120	16900	3200	8000	5210	4060	1520	1040	2180
25	3080	1960	2500	2110	15900	3210	7900	5240	3780	1270	1060	2180
26	3030	1970	2400	2230	14700	3520	7600	5030	3300	1460	1230	2350
27	2820	2010	2300	2100	13500	3530	7200	4850	3010	1390	1070	2920
28	2670	2020	2200	2150	12600	3250	7000	4840	2720	1780	1410	3880
29	2850	2030	2200	2300	---	3840	6800	4660	2550	1970	1780	3810
30	3080	2170	2300	2300	---	4200	6600	4390	2450	2100	2170	4320
31	2930	---	2400	2300	---	4000	---	3890	---	2000	2240	---
TOTAL	83280	67220	128990	65610	187050	166280	208800	221930	108970	51680	45870	65340
MEAN	2686	2241	4161	2116	6680	5364	6960	7159	3632	1667	1480	2178
MAX	3440	2690	8100	2300	17200	11600	12000	14000	6220	2320	2240	4320
MIN	2160	1960	2200	1900	2000	3200	3500	3700	2450	1270	1040	1490
CFSM	.55	.46	.85	.43	1.36	1.10	1.42	1.46	.74	.34	.30	.44
IN.	.63	.51	.98	.50	1.42	1.26	1.59	1.68	.83	.39	.35	.50

CAL YR 1980 TOTAL 1227780 MEAN 3355 MAX 9120 MIN 1410 CFSM .69 IN 9.32
WTR YR 1981 TOTAL 1401020 MEAN 3838 MAX 17200 MIN 1040 CFSM .78 IN 10.64

04119300 GRAND RIVER AT EASTMANVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°00'53", long 85°57'21", in NE¼ NW¼ sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at bridge on 68th Avenue at Eastmanville, 1.1 mi (1.8 km) downstream from Deer Creek, and at mile 19.3 (31.1 km).

DRAINAGE AREA.--5,230 mi² (13,550 km²), approximately.

PERIOD OF RECORD.--February 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURES: February 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1980.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer, between 1600 and 1900 hours. Specific conductance and water temperature records are based on monitor and once-daily measurements. Water-discharge measurement made at time of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1100 micromhos Mar. 2, 1979; minimum daily, 354 micromhos May 12, 1981.
WATER TEMPERATURES.--Maximum daily, 28.0°C July 8, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum observed, 787 micromhos Jan. 27; minimum, 354 micromhos May 12.
WATER TEMPERATURE: Maximum, 28.0°C July 8; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
NOV											
25...	1500	2150	693	7.6	3.5	13.4	101	--	--	290	51
JAN											
27...	1230	1880	787	7.9	.0	13.5	95	K5	110	290	27
APR											
08...	1300	3570	660	7.9	12.0	11.4	109	K29	71	280	42
JUN											
16...	1300	6590	521	7.9	23.0	7.2	86	900	1800	270	49
JUL											
22...	1245	1690	630	8.3	22.5	14.0	163	900	K25	260	55
SEP											
23...	1345	2270	545	8.6	14.0	13.8	134	--	--	290	93

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
NOV											
25...	77	24	27	.7	17	2.9	280	0	230	11	60
JAN											
27...	79	23	30	.8	18	2.5	320	0	262	6.4	--
APR											
08...	76	23	22	.6	14	2.7	290	0	238	5.8	64
JUN											
16...	72	21	18	.5	13	2.5	270	0	221	5.2	41
JUL											
22...	67	23	30	.8	20	2.7	250	0	205	1.5	58
SEP											
23...	77	23	23	.6	15	2.4	240	10	213	1.0	57

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)
NOV 25...	45	.2	3.8	424	390	2490	1.3	.330	.40	.40
JAN 27...	--	--	4.5	--	--	--	1.8	.880	1.1	.62
APR 08...	38	.2	2.1	411	375	3960	.88	.290	--	.81
JUN 15...	31	.2	5.2	345	323	6150	1.1	.130	--	1.2
JUL 22...	50	.3	3.7	421	351	1920	.50	.080	--	1.2
SEP 23...	35	.2	4.5	--	346	2120	.70	.200	--	.68

DATE	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 25...	.73	2.0	9.0	.100	.31	.070	5.9	4	23	100
JAN 27...	1.50	3.3	15	.110	.34	.110	--	5	25	100
APR 08...	1.10	2.0	8.8	.080	.25	.010	--	20	193	100
JUN 15...	1.30	2.4	11	.140	.43	<.010	8.6	71	1260	100
JUL 22...	1.30	1.8	8.0	.160	.49	<.010	--	24	110	100
SEP 23...	.88	1.6	7.0	.090	.28	.010	--	26	159	100

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04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
JAN 27...	1230	1	1	100	60	0	0	20	10	3	2
APR 08...	1300	1	1	100	50	0	0	<10	<10	1	0
JUL 22...	1245	2	1	100	50	1	--	<10	10	2	1
SEP 23...	1345	3	2	100	100	1	1	10	10	3	2

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
JAN 27...	25	19	840	230	17	6	20	--	.3	.3
APR 08...	6	3	460	10	8	0	60	4	<.1	<.1
JUL 22...	10	5	550	10	--	3	90	1	<.1	<.1
SEP 23...	11	4	510	10	8	2	60	<10	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
JAN 27...	22	16	0	0	0	0	70	40	5.3	.1
APR 08...	27	13	0	0	0	0	10	<4	7.3	.8
JUL 22...	19	13	0	0	<1	0	10	--	5.5	5.0
SEP 23...	12	7	<1	<1	<1	<1	20	<10	--	3.5

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 25,80		APR 8,81		JUN 16,81		JUL 22,81		SEP 23,81	
TIME	1500		1300		1300		1245		1345	
TOTAL CELLS/ML	2000		18000		43000		98000		43000	
DIVERSITY: DIVISION	1.1		1.0		1.3		1.3		1.6	
.CLASS	1.1		1.0		1.3		1.3		1.6	
..ORDER	1.7		1.4		2.0		1.6		1.8	
...FAMILY	1.9		1.6		2.7		2.4		2.1	
....GENUS	2.7		1.8		3.3		2.8		2.7	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	130	1	--	-	--	-	340	1
....TETRAEDRON	--	-	130	1	*	0	*	0	--	-
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	--	-	--	-	1500	4	31000#	32	520	1
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	4800	5	520	1
...OOCYSTACEAE										
....ANKISTRODESMUS	33	2	400	2	280	1	--	-	1000	2
....FRANCEIA	--	-	--	-	*	0	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	7700#	18	--	-	*	0
....OOCYSTIS	--	-	--	-	--	-	1200	1	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	520	1
...SCENEDESMACEAE										
....COELASTRUM	--	-	--	-	--	-	3000	3	--	-
....SCENEDESMUS	--	-	--	-	3400	8	9600	10	5300	12
....TETRASTRUM	--	-	--	-	2200	5	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	130	7	400	2	--	-	900	1	340	1
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	4500	10	4800	5	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	350#	18	--	-	9400#	22	26000#	26	11000#	25
....MELOSIRA	84	4	670	4	7700#	18	7200	7	6400	15
....STEPHANODISCUS	750#	38	12000#	67	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....RHOICOSPHENIA	--	-	--	-	*	0	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	*	0	--	-	--	-
....CYMBELLA	--	-	--	-	*	0	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	*	0	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	100	5	400	2	--	-	--	-	--	-
....SYNEDRA	50	3	130	1	280	1	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	130	1	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	50	3	--	-	840	2	--	-	*	0
...NITZSCHIACEAE										
....NITZSCHIA	100	5	400	2	1100	3	1200	1	*	0
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	280	14	400	2	*	0	7200	7	1200	3
....GOMPHOSPHAERIA	--	-	--	-	1100	3	--	-	--	-
..NOSTOCALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	1200	3
....APHANIZOMENON	--	-	--	-	--	-	--	-	14000#	33
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	2100	5	--	-	--	-
....OSCILLATORIA	--	-	2700#	15	--	-	--	-	--	-

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 25,80 1500		APR 8,81 1300		JUN 16,81 1300		JUL 22,81 1245		SEP 23,81 1345	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	33	2	--	-	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..DINOKONTAE										
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	*	0	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	702	700	701	737	723	731	752	744	748
2	---	---	---	702	700	701	723	710	717	756	749	753
3	---	---	---	708	699	701	708	696	700	753	748	750
4	---	---	---	717	704	709	705	694	700	762	753	758
5	---	---	---	707	702	704	703	696	701	764	756	760
6	---	---	---	704	697	700	701	695	697	758	754	756
7	648	640	645	729	695	706	724	684	701	766	757	763
8	650	640	644	718	695	702	681	628	652	774	763	769
9	663	651	656	740	695	717	624	610	616	772	767	769
10	676	662	669	714	707	709	621	616	619	773	768	770
11	680	672	676	707	705	706	619	617	618	776	767	771
12	685	673	680	707	705	706	616	611	614	768	764	765
13	685	682	684	737	706	712	611	608	610	769	764	767
14	688	684	686	738	710	722	611	607	610	771	768	769
15	699	687	694	710	708	709	607	601	604	772	763	768
16	698	693	695	710	709	710	599	596	597	763	758	760
17	697	677	686	721	710	712	595	591	593	759	754	756
18	686	659	670	722	714	716	593	589	592	755	754	754
19	682	673	678	715	712	713	692	591	631	754	751	753
20	678	671	674	714	703	709	693	691	692	753	751	752
21	679	672	677	727	710	721	690	686	688	753	752	753
22	689	678	683	710	696	702	696	689	694	753	750	752
23	689	682	687	709	696	700	691	589	690	750	744	748
24	688	675	683	752	713	735	689	688	689	743	740	741
25	691	678	686	730	641	723	689	688	689	740	737	738
26	687	681	685	723	716	720	688	688	688	737	730	734
27	692	687	690	750	718	728	699	688	689	731	729	730
28	707	696	701	746	734	740	734	703	723	731	728	729
29	701	698	699	732	717	721	736	734	735	735	731	733
30	706	700	702	736	704	712	736	735	735	744	732	735
31	705	700	703	---	---	---	745	736	739	754	745	751
MONTH				752	641	712	745	589	669	776	728	753

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	751	741	744	463	452	459	617	609	614	569	564	567
2	742	738	739	471	464	469	617	614	615	563	546	554
3	739	736	737	475	472	474	617	611	614	565	537	550
4	737	735	736	475	474	474	634	616	627	598	564	582
5	737	735	736	475	474	474	629	627	628	599	585	593
6	735	734	735	476	473	475	626	621	624	617	571	584
7	734	733	734	474	473	474	633	620	626	630	611	620
8	734	733	734	474	473	473	644	634	639	614	579	588
9	734	733	734	476	473	474	642	616	633	591	576	583
10	735	733	734	477	474	475	615	610	612	611	582	595
11	735	734	735	480	477	479	613	581	605	586	375	505
12	736	735	735	499	480	489	576	554	564	383	354	368
13	736	735	736	512	496	503	564	552	559	403	382	392
14	736	735	735	515	508	512	566	533	551	409	403	405
15	736	735	736	582	511	543	557	509	525	435	410	421
16	735	733	734	581	579	580	512	505	510	466	436	450
17	735	734	734	592	578	588	509	500	505	485	467	477
18	757	611	702	591	587	590	510	505	507	497	486	492
19	602	525	563	598	586	592	512	509	510	502	497	500
20	523	433	481	597	592	594	512	509	511	508	500	503
21	426	414	420	591	589	590	510	508	509	519	505	512
22	412	383	396	589	583	586	512	507	508	538	517	527
23	384	380	381	585	581	583	543	512	531	542	531	537
24	391	384	387	584	579	582	544	539	542	559	540	550
25	398	391	395	580	570	577	550	542	546	559	545	551
26	414	399	406	626	580	598	551	548	549	562	547	557
27	433	414	423	629	611	621	549	546	548	577	561	569
28	451	434	444	607	572	586	556	549	551	585	571	577
29	---	---	---	608	586	602	565	556	562	587	576	582
30	---	---	---	620	607	614	568	562	565	594	583	587
31	---	---	---	618	609	614	---	---	---	591	578	586
MONTH	757	380	625	629	452	540	644	500	566	630	354	531

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	ONCE-DAILY
		JUNE			JULY			AUGUST		SEPTEMBER
1	592	582	587	598	577	583	547	538	542	---
2	597	589	592	596	581	589	550	542	546	640
3	621	597	608	601	585	594	579	547	562	---
4	623	602	613	613	597	607	584	577	581	---
5	628	602	615	614	605	609	601	586	592	599
6	628	614	623	612	600	606	611	593	602	576
7	627	614	621	616	604	613	614	592	602	573
8	627	619	621	632	617	626	613	600	609	573
9	623	619	621	641	623	632	605	598	601	611
10	623	608	615	640	617	629	608	596	602	611
11	627	616	621	640	622	631	605	596	600	608
12	634	624	628	641	619	631	604	598	601	614
13	636	631	633	642	615	631	610	602	606	614
14	636	586	612	627	575	598	613	605	609	624
15	598	551	579	592	585	591	614	595	602	622
16	569	560	566	612	592	599	607	600	604	626
17	570	557	565	626	600	608	607	599	603	625
18	564	532	549	632	611	622	610	603	607	621
19	540	533	537	655	625	635	614	605	609	610
20	546	537	542	642	620	628	612	606	609	611
21	552	546	549	633	616	624	614	595	603	619
22	552	542	548	632	608	620	614	595	604	623
23	552	544	548	623	600	610	611	595	605	594
24	558	547	553	614	603	607	614	595	602	623
25	562	555	558	609	602	605	610	601	606	623
26	566	556	559	645	608	624	614	606	611	603
27	568	558	562	643	602	623	---	---	---	603
28	570	560	566	612	596	602	---	---	---	602
29	590	570	579	608	547	589	---	---	---	602
30	606	588	595	547	537	542	---	---	---	603
31	---	---	---	550	542	547	---	---	---	
MONTH	636	532	586	655	537	608				

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	6.5	5.5	6.0	3.5	2.5	3.0	.0	.0	.0
2	---	---	---	6.0	5.0	5.5	3.0	2.0	2.5	.0	.0	.0
3	---	---	---	7.0	5.5	6.5	2.0	.5	1.5	.0	.0	.0
4	---	---	---	7.5	7.0	7.0	.5	.0	.5	.0	.0	.0
5	---	---	---	7.0	6.5	7.0	1.0	.5	.5	.0	.0	.0
6	---	---	---	7.0	6.5	6.5	2.0	1.0	1.5	.0	.0	.0
7	12.0	11.5	12.0	7.5	6.5	7.0	4.5	2.0	3.0	.0	.0	.0
8	13.0	11.5	12.0	7.5	7.0	7.0	4.5	4.0	4.0	.0	.0	.0
9	13.0	12.0	12.5	7.5	7.0	7.0	4.0	3.5	4.0	.0	.0	.0
10	13.0	12.0	12.5	7.5	6.5	7.0	3.5	3.0	3.5	.0	.0	.0
11	13.0	11.5	12.0	6.5	6.0	6.0	3.0	2.5	3.0	.0	.0	.0
12	11.5	10.5	11.0	5.5	5.0	5.5	2.5	1.5	2.0	.0	.0	.0
13	10.5	10.0	10.5	6.0	5.0	5.5	1.5	1.0	1.5	.0	.0	.0
14	10.5	9.5	10.0	6.0	5.5	5.5	1.0	.5	.5	.0	.0	.0
15	10.0	9.5	9.5	6.0	5.5	5.5	.5	.0	.0	.0	.0	.0
16	11.0	9.5	10.0	5.5	5.0	5.5	.5	.0	.5	.0	.0	.0
17	12.0	11.0	11.5	5.0	5.0	5.0	.0	.0	.0	.0	.0	.0
18	12.0	11.0	11.5	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0
19	11.0	10.5	11.0	4.0	3.5	4.0	.0	.0	.0	.0	.0	.0
20	10.5	10.0	10.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
21	10.5	10.0	10.0	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0
22	10.0	9.0	9.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
23	10.0	9.0	9.5	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0
24	10.0	9.0	9.5	4.0	4.0	4.0	.0	.0	.0	.0	.0	.0
25	9.5	9.0	9.5	4.0	3.5	4.0	.0	.0	.0	.0	.0	.0
26	8.5	7.5	8.0	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
27	7.5	7.0	7.5	3.5	2.5	3.0	.0	.0	.0	.5	.0	.0
28	7.0	6.5	6.5	2.5	2.5	2.5	.0	.0	.0	.5	.0	.0
29	6.5	5.5	6.0	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
30	6.0	5.0	6.0	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
31	6.5	5.5	6.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH				7.5	2.0	5.0	4.5	.0	1.0	.5	.0	.0

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	2.0	2.0	2.0	12.0	11.0	11.5	13.5	12.5	13.0
2	.0	.0	.0	2.0	1.5	1.5	12.0	10.5	11.0	14.0	13.0	13.0
3	.0	.0	.0	2.0	1.5	1.5	12.5	11.0	12.0	15.0	13.0	14.0
4	.0	.0	.0	2.0	1.5	2.0	13.5	12.0	13.0	16.5	14.5	15.5
5	.0	.0	.0	2.5	2.0	2.0	12.5	10.5	11.5	16.5	16.0	16.5
6	.0	.0	.0	2.5	2.0	2.0	11.0	9.5	10.0	16.0	15.0	15.5
7	.0	.0	.0	2.0	2.0	2.0	11.5	9.5	10.5	16.5	14.5	15.5
8	.0	.0	.0	2.5	2.0	2.0	11.5	10.5	11.0	16.5	15.0	16.0
9	.0	.0	.0	3.0	2.0	2.5	13.0	11.0	12.0	17.0	15.5	16.5
10	.0	.0	.0	3.0	2.5	3.0	13.0	11.5	12.5	16.5	13.5	15.5
11	.0	.0	.0	3.0	2.5	3.0	14.0	12.5	13.0	13.5	9.0	10.5
12	.0	.0	.0	4.0	2.5	3.0	13.5	12.5	13.0	10.0	8.5	9.5
13	.0	.0	.0	4.0	3.0	3.5	12.5	12.0	12.0	10.5	9.5	10.0
14	.0	.0	.0	4.0	3.0	3.5	12.5	12.0	12.0	11.0	10.5	11.0
15	.0	.0	.0	5.0	3.5	4.0	12.0	11.5	11.5	12.0	9.5	11.0
16	.0	.0	.0	4.5	3.5	4.0	12.0	11.0	11.5	13.0	11.5	12.0
17	.0	.0	.0	5.0	3.5	4.0	13.0	11.5	12.0	13.5	12.5	13.0
18	.5	.0	.5	4.0	3.5	4.0	13.5	12.5	13.0	13.5	13.0	13.5
19	.5	.5	.5	3.5	2.5	3.0	13.5	13.0	13.5	14.5	13.5	14.0
20	.5	.0	.5	3.0	2.5	2.5	13.0	12.5	13.0	15.5	14.0	14.5
21	.5	.0	.5	4.0	2.0	3.0	12.5	12.0	12.5	16.0	15.0	15.5
22	1.0	.5	1.0	5.0	3.0	4.0	12.0	12.0	12.0	17.5	16.0	16.5
23	1.5	1.0	1.5	6.0	3.5	5.0	12.0	11.5	11.5	18.0	17.0	17.5
24	2.0	1.5	2.0	6.5	4.5	5.5	11.5	10.5	11.0	18.5	17.5	18.0
25	2.5	2.0	2.0	7.5	5.0	6.5	10.5	10.0	10.5	20.0	18.0	19.0
26	2.5	2.0	2.0	8.0	6.5	7.0	10.5	10.0	10.5	20.5	19.0	19.5
27	2.0	2.0	2.0	9.0	7.0	8.0	11.0	10.0	10.5	20.5	19.5	20.0
28	2.0	2.0	2.0	9.5	7.5	8.5	12.0	11.0	11.5	20.5	19.5	20.0
29	---	---	---	10.0	9.0	9.5	12.5	11.5	12.0	20.5	19.5	20.0
30	---	---	---	11.0	10.0	10.5	13.0	12.0	12.5	20.5	19.5	20.0
31	---	---	---	12.0	10.0	11.0	---	---	---	20.5	19.0	20.0
MONTH	2.5	.0	.5	12.0	1.5	4.5	14.0	9.5	12.0	20.5	8.5	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	ONCE-DAILY
		JUNE			JULY			AUGUST		SEPTEMBER
1	21.0	19.0	20.0	24.0	22.5	23.5	24.5	22.0	23.0	---
2	20.5	19.5	20.0	24.0	22.5	23.0	24.0	22.0	23.0	22.0
3	21.5	19.5	20.5	24.5	22.5	23.5	24.5	22.0	23.0	---
4	22.0	20.0	21.0	25.5	23.5	24.5	24.0	22.0	23.0	---
5	22.5	20.5	21.5	26.0	23.5	24.5	24.0	22.0	23.0	22.0
6	23.0	21.5	22.5	26.5	24.5	25.5	25.0	22.5	23.5	21.0
7	23.5	21.5	22.5	27.0	24.5	26.0	24.5	22.5	24.0	21.0
8	22.5	21.5	22.0	28.0	26.0	27.0	24.5	22.5	23.5	21.0
9	21.5	20.5	21.0	27.5	26.5	27.0	25.0	22.0	23.5	21.0
10	22.0	20.0	21.0	27.0	25.0	26.0	25.0	22.5	24.0	21.0
11	22.0	20.5	21.5	26.5	25.0	26.0	24.5	22.0	23.5	21.0
12	22.5	21.0	21.5	26.5	25.0	26.0	24.5	22.0	23.0	21.0
13	22.5	21.5	22.0	26.5	25.5	26.0	25.0	22.5	24.0	21.0
14	23.0	21.5	22.0	26.5	24.5	25.5	24.5	22.5	23.5	20.0
15	23.5	22.0	23.0	26.0	23.5	24.5	24.5	22.0	23.0	20.0
16	23.0	22.5	23.0	24.5	23.0	23.5	23.0	22.0	22.5	20.0
17	22.5	21.5	22.0	25.0	23.0	24.0	23.0	20.0	21.5	19.0
18	23.0	22.0	22.5	25.5	24.0	25.0	23.0	20.0	21.5	18.0
19	23.0	22.0	22.5	25.5	25.0	25.5	23.0	20.0	21.5	17.0
20	22.5	21.5	22.0	25.5	24.5	25.0	23.0	20.5	22.0	16.0
21	22.0	21.5	21.5	25.0	24.0	24.5	23.0	20.5	22.0	16.0
22	22.0	21.0	21.5	24.5	22.5	23.5	23.0	20.5	22.0	15.0
23	22.0	20.5	21.5	23.5	22.0	22.5	23.0	21.0	22.5	15.0
24	22.5	21.5	22.0	24.5	22.0	23.0	24.0	22.0	23.0	14.0
25	22.5	21.5	22.0	25.0	22.0	24.0	24.0	22.0	22.5	14.0
26	23.0	21.0	22.0	25.0	24.0	24.5	23.0	22.0	22.5	15.0
27	23.0	21.0	22.0	24.5	22.0	22.5	---	---	---	15.0
28	22.5	21.5	22.0	23.0	20.0	21.0	---	---	---	15.0
29	23.5	21.5	22.5	20.5	19.5	20.0	---	---	---	14.0
30	24.0	22.5	23.5	22.0	20.0	21.0	---	---	---	14.0
31	---	---	---	22.5	20.5	21.5	---	---	---	
MONTH	24.0	19.0	22.0	28.0	19.5	24.0				

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW¼ NW¼ sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft (3 m) downstream from bridge on county road, 0.5 mi (0.8 km) north of Vogel Center, and 3.5 mi (5.6 km) southeast of Falmouth.

DRAINAGE AREA.--243 mi^2 (629 km^2).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft (344 m), from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 124 ft^3/s (3.512 m^3/s), 6.93 in/yr (176 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft^3/s (32.6 m^3/s) Apr. 13, 1971, gage height, 6.33 ft (1.929 m); minimum, 29 ft^3/s (0.82 m^3/s) Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 360 ft^3/s (10.2 m^3/s) Apr. 30, gage height, 4.30 ft (1.311 m), only peak above base of 350 ft^3/s (9.91 m^3/s); minimum discharge, 46 ft^3/s (1.30 m^3/s) Aug. 25, 26; minimum gage height, 2.46 ft (0.750 m) Aug. 25, 26, Sept. 14, 15, 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	108	104	98	90	79	190	148	262	78	127	54	65
2	112	103	87	90	78	171	134	196	76	95	55	63
3	127	99	75	90	77	150	116	166	77	81	56	61
4	135	100	90	90	74	144	119	151	80	72	56	60
5	130	107	98	94	76	132	126	141	78	68	55	60
6	123	108	100	96	76	124	124	136	75	65	56	59
7	115	103	115	98	76	119	116	129	72	60	59	58
8	110	103	138	99	77	117	112	124	80	56	64	66
9	103	103	153	99	78	117	165	126	78	55	68	71
10	102	103	150	98	78	121	198	124	72	52	65	63
11	102	102	105	95	81	123	166	154	70	52	78	58
12	104	99	105	94	84	120	132	166	70	56	63	55
13	106	98	105	96	86	126	114	159	72	57	58	53
14	107	120	102	96	86	123	140	148	77	54	59	52
15	108	144	98	97	85	123	192	142	83	54	68	52
16	119	136	94	98	84	122	178	138	82	56	69	55
17	124	120	90	97	87	120	150	129	78	57	63	57
18	126	112	87	96	94	115	132	120	75	55	58	56
19	126	108	90	94	120	110	122	117	72	57	55	55
20	120	104	92	92	195	110	115	107	74	60	54	54
21	115	104	93	93	215	108	111	98	76	65	53	57
22	110	104	98	90	235	110	107	90	89	61	52	62
23	99	104	94	92	252	112	120	86	100	58	52	59
24	103	106	94	92	280	117	159	102	90	56	51	55
25	108	103	96	91	274	126	168	115	81	57	49	56
26	107	98	96	89	226	129	158	106	71	63	50	63
27	93	97	96	87	182	126	147	94	66	57	52	64
28	92	98	95	86	188	130	208	87	62	58	63	59
29	99	97	94	84	---	138	328	83	65	61	77	71
30	107	97	93	80	---	158	348	82	116	59	78	78
31	111	---	93	80	---	156	---	80	---	57	72	---
TOTAL	3451	3184	3114	2863	3623	3987	4653	3958	2335	1941	1862	1797
MEAN	111	106	100	92.4	129	129	155	128	77.8	62.6	60.1	59.9
MAX	135	144	153	99	280	190	348	262	116	127	78	78
MIN	92	97	75	80	74	108	107	80	62	52	49	52
CFSM	.46	.44	.41	.38	.53	.53	.64	.53	.32	.26	.25	.25
IN.	.53	.49	.48	.44	.55	.61	.71	.61	.36	.30	.29	.28

CAL YR 1980 TOTAL 41138 MEAN 112 MAX 388 MIN 58 CFSM .46 IN 6.30
WTR YR 1981 TOTAL 36768 MEAN 101 MAX 348 MIN 49 CFSM .42 IN 5.63

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW¼ NE¼ sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft (152 m) downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi (0.6 km) upstream from Twin Creek, and at mile 123.9 (199.4 km).

DRAINAGE AREA.--1,450 mi^2 (3,760 km^2) approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft (298.009 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft (122 m) and 500 ft (152 m) upstream at present datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flow from dams above station.

AVERAGE DISCHARGE.--49 years, 992 ft^3/s (28.09 m^3/s), 9.29 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft^3/s (221 m^3/s) Mar. 29, 1976; maximum gage height, 14.42 ft (4.395 m) Apr. 9, 1959; minimum discharge observed, 164 ft^3/s (4.64 m^3/s) Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,200 ft^3/s (90.6 m^3/s) Feb. 25, gage height, 9.90 ft (3.018 m); maximum gage height, 9.94 ft (3.030 m) Dec. 21, backwater from ice; minimum discharge, 415 ft^3/s (11.8 m^3/s) Aug. 3, 4, 5, 26, gage height, 6.74 ft (2.054 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	731	794	782	760	770	2640	1510	3070	926	556	440	591
2	705	764	802	770	780	2550	1520	2780	869	652	425	552
3	729	740	699	770	780	2290	1480	2370	827	682	420	526
4	831	772	602	780	780	2100	1510	2140	799	664	415	506
5	871	783	702	790	780	1940	1490	2030	764	634	415	496
6	888	777	804	800	790	1780	1430	1900	730	592	420	483
7	861	784	895	800	780	1630	1350	1740	706	562	440	474
8	816	778	1150	800	780	1520	1340	1560	700	533	455	490
9	766	780	1370	800	790	1440	2110	1410	700	511	470	486
10	733	776	1400	800	780	1400	2430	1360	676	480	490	487
11	705	762	1250	800	780	1350	2470	1650	646	465	511	480
12	688	746	1060	800	780	1300	2230	1760	628	480	522	468
13	688	744	984	800	780	1300	1950	1670	616	485	522	456
14	714	829	984	790	780	1280	2150	1560	610	470	528	443
15	802	884	824	780	790	1250	2360	1460	640	465	586	429
16	902	907	792	780	810	1260	2320	1360	670	465	592	424
17	984	911	784	780	840	1230	2170	1250	652	450	574	439
18	1030	890	594	780	870	1170	1960	1160	628	445	550	445
19	1020	859	594	790	1150	1110	1800	1080	610	445	522	444
20	999	821	636	790	1650	1070	1670	1020	586	490	495	444
21	977	814	690	800	2000	1040	1550	955	574	506	475	481
22	948	793	720	800	2500	1020	1430	911	640	500	460	597
23	917	780	760	780	2800	1010	1390	862	706	480	450	571
24	879	789	760	780	3040	1020	1470	876	700	460	440	520
25	897	780	760	800	3050	1030	1530	1150	670	450	432	509
26	896	765	750	800	2750	1070	1500	1190	616	435	423	575
27	891	770	750	800	2580	1100	1440	1170	574	440	428	606
28	859	782	750	790	2630	1110	1920	1150	544	455	478	565
29	826	783	750	780	---	1150	2850	1110	522	475	592	534
30	814	776	750	770	---	1300	3070	1070	528	470	637	544
31	798	---	760	770	---	1440	---	994	---	460	632	---
TOTAL	26165	23933	25908	24430	38390	43900	55400	45768	20057	15657	15239	15065
MEAN	844	798	836	788	1371	1416	1847	1476	669	505	492	502
MAX	1030	911	1400	800	3050	2640	3070	3070	926	682	637	606
MIN	688	740	594	760	770	1010	1340	862	522	435	415	424
CFSM	.58	.55	.58	.54	.95	.98	1.27	1.02	.46	.35	.34	.35
IN.	.67	.61	.66	.63	.98	1.13	1.42	1.17	.51	.40	.39	.39

CAL YR 1980 TOTAL 345333 MEAN 944 MAX 2960 MIN 452 CFSM .65 IN 8.86
WTR YR 1981 TOTAL 349912 MEAN 959 MAX 3070 MIN 415 CFSM .66 IN 8.98

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1956 to current year.

INSTRUMENTATION.--Temperature recorder since November 1956.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 1963, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 25.5°C July 7-9, 13; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.0	3.5	3.5	1.0	1.0	.0	.0	.0	.0	1.0	1.0
2	14.0	12.0	3.5	3.0	1.0	.0	.0	.0	.0	.0	1.0	.5
3	13.5	10.5	4.5	3.5	.0	.0	.0	.0	.0	.0	.5	.5
4	10.5	9.0	5.0	4.5	.0	.0	.0	.0	.0	.0	.5	.5
5	9.0	8.5	5.0	4.5	.0	.0	.0	.0	.0	.0	1.0	.5
6	8.5	8.0	4.5	4.0	.0	.0	.0	.0	.0	.0	1.0	.5
7	8.5	7.0	4.5	4.5	.0	.0	.0	.0	.0	.0	.5	.5
8	10.5	8.5	4.5	3.5	.0	.0	.0	.0	.0	.0	1.0	.5
9	10.0	9.0	4.0	4.0	.5	.0	.0	.0	.0	.0	1.5	1.0
10	9.5	8.5	4.0	3.5	.5	.0	.0	.0	.0	.0	3.0	1.5
11	9.5	9.0	3.5	3.0	.0	.0	.0	.0	.0	.0	3.0	2.0
12	9.0	8.0	3.0	2.0	.0	.0	.0	.0	.0	.0	3.0	1.5
13	8.5	8.0	2.0	2.0	.0	.0	.0	.0	.0	.0	3.0	2.0
14	8.0	5.5	2.0	2.0	.0	.0	.0	.0	.0	.0	3.0	1.5
15	5.5	5.0	3.0	2.0	.0	.0	.0	.0	.0	.0	3.0	2.0
16	5.5	5.0	3.0	2.0	.0	.0	.0	.0	.0	.0	3.0	2.0
17	7.0	5.5	2.0	1.5	.0	.0	.0	.0	.0	.0	3.0	2.0
18	7.0	7.0	1.5	1.0	.0	.0	.0	.0	.0	.0	3.0	2.0
19	7.0	7.0	1.0	.5	.0	.0	.0	.0	.0	.0	2.0	1.5
20	7.0	6.5	1.5	1.0	.0	.0	.0	.0	.0	.0	1.5	1.5
21	7.0	6.5	1.5	1.5	.0	.0	.0	.0	.5	.0	3.5	1.5
22	7.0	6.5	1.5	1.0	.0	.0	.0	.0	.5	.5	4.5	3.0
23	8.0	6.0	1.5	1.5	.0	.0	.0	.0	.5	.5	5.0	4.0
24	6.5	6.0	2.0	1.5	.0	.0	.0	.0	.5	.5	5.5	4.0
25	6.5	6.5	2.0	1.5	.0	.0	.0	.0	.5	.5	6.0	4.5
26	6.5	5.5	1.5	.5	.0	.0	.0	.0	1.0	.5	5.5	5.5
27	5.5	5.0	.5	.5	.0	.0	.0	.0	1.0	1.0	6.5	5.0
28	5.0	4.5	.5	.5	.0	.0	.0	.0	1.0	1.0	6.5	6.0
29	4.5	3.5	.5	.5	.0	.0	.0	.0	---	---	7.0	6.5
30	3.5	3.0	1.0	.5	.0	.0	.0	.0	---	---	8.5	7.0
31	4.0	3.0	---	---	.0	.0	.0	.0	---	---	9.5	8.5
MONTH	14.5	3.0	5.0	.5	1.0	.0	.0	.0	1.0	.0	9.5	.5

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	9.5	8.5	10.5	10.5	19.0	16.5	23.0	20.0	23.5	19.0	20.0	19.0
2	8.5	7.0	11.0	9.5	19.0	17.0	24.0	20.0	23.0	20.0	20.0	18.5
3	9.5	8.5	12.0	10.5	20.0	18.0	23.5	20.5	23.0	19.5	19.0	18.0
4	11.0	9.5	15.0	12.0	19.5	18.5	24.0	21.5	23.0	20.5	19.0	17.0
5	11.0	8.0	15.5	15.0	20.5	17.0	24.0	21.0	23.5	20.0	18.0	16.5
6	8.5	6.5	15.0	14.0	21.5	19.5	25.0	21.5	23.0	20.5	18.0	16.5
7	9.0	7.0	15.0	13.5	21.0	19.0	25.5	22.0	21.5	19.5	18.5	16.5
8	9.0	9.0	15.0	13.5	20.5	19.0	25.5	23.0	21.5	19.5	18.0	16.0
9	9.5	8.5	15.5	14.0	19.5	18.5	25.5	24.0	21.0	19.0	17.0	14.5
10	10.0	9.5	15.0	11.5	20.0	18.5	25.0	21.0	21.0	19.5	18.5	15.5
11	12.0	10.0	11.5	10.0	20.5	18.5	24.5	21.0	21.5	19.5	20.0	16.5
12	12.0	11.0	11.0	9.0	20.5	19.0	23.5	21.0	21.0	19.0	20.0	17.0
13	11.0	10.0	13.0	10.5	20.0	19.0	25.5	22.0	21.5	19.0	19.5	16.5
14	10.5	10.0	13.5	12.0	20.0	18.5	25.0	21.5	21.5	20.0	19.0	16.5
15	10.0	8.5	13.0	12.0	22.0	20.0	23.0	20.5	20.5	19.5	18.0	15.5
16	9.0	8.5	14.5	12.0	22.0	20.0	22.0	19.5	20.5	18.5	16.0	13.5
17	11.0	9.0	15.0	14.0	21.0	18.0	23.0	20.0	20.5	17.0	13.5	12.0
18	11.5	10.5	15.5	14.0	20.5	18.5	23.5	20.0	20.5	17.0	13.0	11.0
19	11.5	9.5	16.0	14.0	21.0	19.0	23.0	21.0	20.5	17.0	14.5	11.0
20	9.5	8.5	17.0	14.5	20.5	18.5	23.0	21.5	21.0	17.0	14.0	11.0
21	9.5	8.5	18.5	15.5	19.5	18.0	21.5	20.0	21.0	17.0	13.0	10.0
22	9.0	8.5	18.5	16.0	19.0	18.0	21.0	18.0	21.0	18.0	10.5	9.0
23	9.0	9.0	19.5	17.0	19.5	16.0	20.5	18.0	21.0	18.5	11.0	9.0
24	9.5	8.5	19.5	18.5	20.0	18.5	21.5	18.5	21.5	19.0	11.0	9.5
25	9.0	8.5	19.0	17.0	20.5	18.5	21.5	19.0	21.5	18.5	11.0	10.5
26	9.0	8.5	19.5	18.5	20.0	17.0	21.5	20.0	21.0	18.5	12.0	10.5
27	8.5	8.0	19.5	18.5	20.5	17.0	20.5	19.0	19.0	18.5	13.0	11.5
28	8.5	8.5	18.5	17.0	20.0	18.0	19.0	16.5	18.5	18.0	11.5	10.0
29	9.0	8.5	19.0	17.0	20.5	19.0	19.5	15.0	19.0	18.0	11.5	10.0
30	10.5	9.0	19.5	18.5	23.5	20.0	20.5	16.5	20.0	18.5	11.0	9.0
31	---	---	19.0	16.5	---	---	21.5	18.0	19.5	18.5	---	---
MONTH	12.0	6.5	19.5	9.0	23.5	16.0	25.5	15.0	23.5	17.0	20.0	9.0

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW¼ SW¼ sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi (0.8 km) downstream from Rustford Dam, and 5.2 mi (8.4 km) east of Morley.

DRAINAGE AREA.--138 mi² (357 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m), from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation by dams above station.

AVERAGE DISCHARGE.--15 years, 123 ft³/s (3.483 m³/s), 12.10 in/yr (307 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,010 ft³/s (28.6 m³/s) Aug. 31, 1975, gage height, 5.92 ft (1.804 m); minimum, 22 ft³/s (0.62 m³/s) July 21, 1979, gage height, 1.53 ft (0.466 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 371 ft³/s (10.5 m³/s) Apr. 9, gage height, 3.32 ft (1.012 m); maximum gage height, 3.40 ft (1.036 m), backwater from ice; no peak above base of 400 ft³/s (11.3 m³/s); minimum discharge 39 ft³/s (1.10 m³/s) July 27, 28; minimum gage height, 1.68 ft (0.512 m) July 27, 28, Aug. 2, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	115	110	92	86	192	148	127	90	141	44	105
2	98	111	108	86	82	164	130	120	85	99	43	96
3	110	107	110	81	88	134	117	113	74	86	47	89
4	115	119	115	80	96	126	145	100	71	79	47	85
5	106	120	109	82	96	121	144	101	71	74	45	73
6	100	114	108	84	94	114	122	103	69	69	44	69
7	97	111	147	84	93	109	110	100	66	63	87	67
8	94	112	230	83	95	109	114	96	73	60	79	71
9	91	111	242	82	96	108	326	98	77	59	67	69
10	89	107	203	80	97	114	304	105	70	57	61	65
11	89	103	150	79	102	110	282	110	65	55	58	63
12	87	100	140	80	110	109	219	103	61	54	55	61
13	86	101	120	82	110	120	189	99	61	55	55	59
14	104	143	116	86	110	109	240	97	76	49	56	59
15	165	139	118	88	108	113	248	96	98	49	75	57
16	163	124	118	90	105	116	213	93	149	52	71	58
17	166	116	115	86	103	109	185	90	105	50	61	70
18	161	112	104	81	135	100	170	90	84	50	57	73
19	142	106	118	80	288	93	155	90	74	46	54	67
20	126	104	135	78	322	94	140	91	70	50	53	63
21	126	106	110	77	270	93	134	92	75	49	53	68
22	122	106	100	80	226	95	129	89	120	47	51	100
23	114	105	90	86	257	98	150	86	113	45	51	87
24	112	107	82	88	262	102	170	97	88	43	50	76
25	135	104	75	85	240	102	151	166	78	42	49	76
26	155	100	76	85	201	112	136	152	73	41	49	111
27	143	100	80	85	170	120	132	123	68	39	52	112
28	133	104	82	82	199	120	135	112	64	51	71	76
29	125	107	86	84	---	108	146	104	63	56	121	58
30	119	106	88	85	---	136	139	108	144	49	136	60
31	118	---	90	87	---	159	---	95	---	47	115	---
TOTAL	3690	3320	3675	2588	4241	3609	5123	3246	2475	1806	1957	2243
MEAN	119	111	119	83.5	151	116	171	105	82.5	58.3	63.1	74.8
MAX	166	143	242	92	322	192	326	166	149	141	136	112
MIN	86	100	75	77	82	93	110	86	61	39	43	57
CFSM	.86	.80	.86	.61	1.09	.84	1.24	.76	.60	.42	.46	.54
IN.	.99	.89	.99	.70	1.14	.97	1.38	.88	.67	.49	.53	.60

CAL YR 1980 TOTAL 39351 MEAN 108 MAX 339 MIN 53 CFSM .78 IN 10.61
WTR YR 1981 TOTAL 37973 MEAN 104 MAX 326 MIN 39 CFSM .75 IN 10.24

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--No record Apr. 19, 20.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C Aug. 23, 1968, June 28, 1971; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.5°C July 13; minimum 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	16.0	13.5	6.0	4.5	3.5	2.5	.0	.0	.0	.0	2.0	1.5
2	15.0	13.0	5.5	4.0	3.5	.0	.0	.0	.0	.0	1.5	.5
3	13.5	10.5	7.5	5.0	.0	.0	.0	.0	.5	.0	2.0	.0
4	10.5	9.0	7.5	7.0	.0	.0	.0	.0	.5	.0	3.0	2.0
5	9.0	8.0	7.0	5.5	1.0	.0	.0	.0	.5	.0	3.5	2.0
6	9.0	7.5	7.5	4.5	2.5	1.0	.0	.0	.0	.0	4.0	2.0
7	10.0	7.0	7.0	6.0	3.0	2.5	.0	.0	.0	.0	3.5	1.0
8	12.5	9.5	6.5	5.0	3.0	2.0	.0	.0	.0	.0	4.0	2.5
9	12.0	9.5	7.0	6.0	2.0	1.5	.0	.0	.0	.0	4.5	3.0
10	11.0	9.0	6.5	5.0	1.5	.5	.0	.0	.0	.0	4.5	3.5
11	10.5	9.5	5.0	4.0	.5	.0	.0	.0	.5	.0	3.5	2.5
12	10.0	8.5	4.0	3.0	.0	.0	.0	.0	.5	.0	5.5	1.5
13	9.5	8.0	6.0	3.5	.5	.0	.0	.0	.0	.0	5.5	3.5
14	9.0	6.5	6.0	5.5	.0	.0	.0	.0	.0	.0	4.5	1.0
15	7.0	6.5	5.5	4.5	.0	.0	.0	.0	.0	.0	5.5	2.5
16	8.5	7.0	5.0	4.0	.0	.0	.0	.0	.0	.0	4.5	1.5
17	11.0	8.5	4.0	3.5	.0	.0	.0	.0	3.0	.0	5.0	2.0
18	11.0	9.5	4.0	3.0	.0	.0	.0	.0	3.0	1.5	3.0	1.5
19	9.5	8.5	3.5	2.0	.0	.0	.0	.0	1.5	1.0	2.5	1.0
20	9.0	8.5	3.5	2.0	.0	.0	.0	.0	2.0	1.0	2.5	1.5
21	9.0	7.5	4.0	3.0	.0	.0	.0	.0	2.0	1.0	6.0	2.0
22	9.0	7.0	3.5	2.0	.0	.0	.0	.0	2.0	1.5	6.5	2.5
23	8.5	7.0	4.0	3.0	.0	.0	1.5	.0	2.5	2.0	7.0	3.0
24	9.0	7.0	4.5	4.0	.0	.0	1.5	.5	2.5	1.5	7.0	4.0
25	9.0	8.0	4.0	2.0	.0	.0	2.0	1.0	2.0	1.0	7.5	3.5
26	8.0	6.5	2.5	1.0	.0	.0	2.0	2.0	2.0	1.0	6.5	5.0
27	6.5	5.5	2.0	1.0	.0	.0	2.0	1.5	1.5	1.0	9.0	5.0
28	6.0	5.0	2.5	1.0	.0	.0	2.0	1.0	2.0	1.5	8.5	5.5
29	5.0	4.0	2.5	2.0	.0	.0	1.0	.0	---	---	9.5	7.5
30	5.0	3.0	3.5	2.0	.0	.0	.5	.0	---	---	9.5	8.5
31	6.5	4.5	---	---	.0	.0	.5	.0	---	---	11.0	7.0
MONTH	16.0	3.0	7.5	1.0	3.5	.0	2.0	.0	3.0	.0	11.0	.0

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	11.0	7.5	12.0	10.0	20.0	14.0	20.5	18.0	23.5	17.5	20.0	18.5
2	9.5	6.0	13.5	8.0	19.0	15.5	21.5	17.5	21.5	18.5	20.0	18.0
3	11.0	8.0	15.5	9.5	20.5	16.5	22.5	18.0	22.5	18.0	19.0	17.5
4	13.0	10.0	18.5	12.0	19.5	16.5	23.0	19.0	22.5	19.0	19.0	17.5
5	10.0	5.0	17.0	13.0	22.0	15.0	24.0	19.5	22.0	18.0	19.0	17.0
6	8.0	3.5	15.0	10.0	22.5	18.0	25.5	20.0	21.0	18.5	18.5	17.0
7	10.5	5.0	15.5	9.5	21.0	16.5	26.0	20.5	20.5	18.0	18.5	16.0
8	9.5	9.0	15.0	10.0	19.5	17.5	26.0	21.0	21.0	18.5	18.5	16.0
9	11.5	7.5	17.0	11.5	19.0	16.0	26.0	22.5	22.0	17.5	17.5	13.5
10	11.0	8.0	15.5	8.5	21.0	17.0	25.0	19.0	22.5	18.5	19.0	15.5
11	13.0	10.5	8.5	7.5	21.0	16.5	23.0	19.5	22.0	18.0	20.5	16.0
12	13.0	9.0	12.0	6.5	22.0	17.5	23.5	20.0	21.0	17.0	20.5	17.0
13	9.5	8.0	15.0	10.5	20.5	17.5	26.5	21.0	22.5	18.0	19.5	15.5
14	10.5	9.0	14.0	11.5	19.5	17.5	25.0	20.0	21.0	19.0	20.0	16.5
15	10.0	6.5	12.5	10.5	21.5	19.0	22.5	18.0	19.5	18.0	18.0	14.5
16	10.0	7.0	15.0	10.0	21.0	18.0	21.0	17.0	20.5	17.0	16.0	13.5
17	14.0	9.5	16.0	12.0	20.5	15.5	22.5	17.5	20.5	15.0	13.5	12.0
18	14.0	10.0	15.5	11.0	21.0	16.0	23.0	18.5	20.5	15.0	13.0	10.5
19	---	---	17.0	11.0	21.0	17.0	21.5	19.5	20.5	15.0	15.0	11.5
20	---	---	18.0	12.0	19.5	16.5	20.5	19.0	21.0	15.5	14.5	11.0
21	10.5	6.5	19.0	13.5	19.0	16.0	19.5	18.0	21.5	16.0	12.5	10.5
22	10.0	8.0	19.0	14.0	18.0	16.0	21.5	15.0	21.0	16.5	12.0	9.5
23	9.5	8.0	19.0	15.5	19.5	15.0	20.5	16.0	22.0	16.5	12.5	9.0
24	9.5	7.0	18.5	16.0	19.5	16.5	23.0	17.0	20.0	17.0	13.5	10.5
25	10.0	7.5	19.5	15.5	21.0	17.0	23.5	18.0	22.0	16.5	13.5	13.0
26	9.0	7.0	19.5	17.0	20.5	15.0	22.0	20.0	20.0	17.0	14.5	13.5
27	11.0	6.5	19.0	16.0	21.0	15.0	20.0	17.0	18.5	17.0	15.0	14.0
28	11.5	10.5	18.5	15.0	20.0	16.5	17.5	15.0	18.5	17.0	14.0	12.0
29	11.0	9.5	19.5	16.0	22.5	17.5	20.5	13.5	18.5	17.0	14.0	11.5
30	12.5	8.0	19.5	16.5	21.5	18.5	21.0	15.5	20.0	18.0	13.5	11.5
31	---	---	18.5	13.5	---	---	22.5	16.5	20.0	18.0	---	---
MONTH	14.0	3.5	19.5	6.5	22.5	14.0	26.5	13.5	23.5	15.0	20.5	9.0

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE¼ NE¼ sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft (183 m) downstream from Penoyer Creek and at mile 39.1 (62.9 km).

DRAINAGE AREA.--2,350 mi^2 (6,090 km^2), approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft (190.753 m) National Geodetic Vertical Datum of 1929. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft (12.192 m) lower.

REMARKS.--Records good. Flow regulated by powerplants above station, the largest of which are at Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--59 years (water years 1910-14, 1917-19, 1931-80), 1,958 ft^3/s (55.45 m^3/s), 11.31 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft^3/s (423 m^3/s) Mar. 25, 1913; minimum, 52 ft^3/s (1.47 m^3/s) Oct. 2, 1965, gage height, 5.31 ft (1.618 m), result of regulation during pipeline repair; minimum daily, 330 ft^3/s (9.35 m^3/s) Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,300 ft^3/s (150 m^3/s) Feb. 24, gage height, 9.87 ft (3.008 m); minimum, 664 ft^3/s (18.8 m^3/s) Aug. 10, 22, 23, 24, gage height, 6.36 ft (1.939 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1720	1320	1580	1540	1930	3680	2850	3640	1830	1400	996	1870
2	2490	1560	1640	1520	2110	3680	2750	3640	1740	1790	998	1630
3	2640	1600	1590	1490	1600	3670	2780	3650	1720	1330	1000	1540
4	2490	1570	1230	1670	1540	3670	2410	3370	1790	1400	1010	1580
5	2320	1820	1310	1520	1800	3470	2130	2810	1150	1610	1000	1210
6	1050	1380	1460	2160	1550	3020	1790	3220	1520	1540	998	1050
7	1010	1850	1680	2000	2300	3010	1440	2690	1820	1610	1050	1050
8	1060	1850	2480	1790	2500	2940	2040	2550	1860	1200	1060	1040
9	1150	1850	2480	1900	2000	2560	3080	2090	1500	1050	1020	1040
10	1150	1650	2660	2000	1300	2780	4340	2280	1050	1040	924	1040
11	1150	1270	2690	2100	1350	2930	4220	3620	1240	1150	1270	1050
12	1150	1460	2080	1800	1300	2540	3860	3360	1700	1060	1270	1020
13	1150	1650	1890	1500	1350	2290	3530	2770	1180	1050	1290	969
14	1190	1850	1330	1320	1300	2290	3530	3410	1760	1310	1240	966
15	1280	1940	1750	1900	1600	2290	3680	2400	1480	1160	1060	966
16	2110	1820	1390	3000	1970	2280	3570	2140	1620	1350	1060	972
17	1870	1940	1210	1600	2080	2090	3550	2020	1680	1050	1270	979
18	2360	1620	1500	1800	2900	1870	3490	1730	1860	1040	1130	972
19	2230	1630	1220	1800	3660	1950	2590	1550	1610	1040	1150	1210
20	2010	2070	1190	2200	3930	2070	2510	1460	1640	1040	1290	1050
21	1680	1850	960	1800	4870	1790	2820	1020	1600	1030	1290	1070
22	1980	1820	1320	1800	4900	1710	2180	1020	1880	1150	1020	1650
23	1690	1770	1090	1770	4900	1960	2310	1590	1490	1460	666	1660
24	1720	1620	944	1450	5060	1810	2290	1990	1430	1740	1160	1010
25	1730	2200	999	1670	5270	1570	2400	2050	1550	1040	1050	1170
26	1470	2370	1030	2050	4920	1860	2420	2250	1050	1040	1170	1600
27	2530	2110	1340	1920	4460	1840	2420	2600	1430	1030	1300	1530
28	2330	1330	1470	1840	3900	2020	2420	2030	1510	1020	1260	1180
29	1720	1810	1950	1830	---	2050	3090	1970	1060	1000	1210	1830
30	1690	1540	1640	1780	---	2000	3640	1930	1950	996	1050	2080
31	1320	---	1220	1440	---	2370	---	2020	---	996	1440	---
TOTAL	53440	52130	48323	55960	78250	76060	86130	74870	46700	37722	34702	37984
MEAN	1724	1738	1559	1805	2795	2454	2871	2415	1557	1217	1119	1266
MAX	2640	2370	2690	3000	5270	3680	4340	3650	1950	1790	1440	2080
MIN	1010	1270	944	1320	1300	1570	1440	1020	1050	996	666	966
CFSM	.73	.74	.66	.77	1.19	1.04	1.22	1.03	.66	.52	.48	.54
IN.	.85	.83	.76	.89	1.24	1.20	1.36	1.19	.74	.60	.55	.60

CAL YR 1980 TOTAL 671523 MEAN 1835 MAX 4760 MIN 716 CFSM .78 IN 10.63
WTR YR 1981 TOTAL 682271 MEAN 1869 MAX 5270 MIN 666 CFSM .80 IN 10.80

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°19'05", long 86°02'11", in SW¼ NW¼ sec.30, T.11 N., R.14 W., Newago County, Hydrologic Unit 04060102, at bridge on Maple Island Road, 5 mi (8 km) southwest of Bridgeton, 13 mi (21 km) upstream from Muskegon Lake, and 20 mi (32 km) downstream from gaging station at Newago.

DRAINAGE AREA.--2,420 mi² (6,270 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981 (discontinued).
WATER TEMPERATURES: November 1974 to September 1981 (discontinued).

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981 (discontinued).

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Water-discharge measurements made at time of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1975, 1978-81), 1550 micromhos Sept. 24, 1979; minimum (water years 1975, 1977-81), 69 micromhos May 3, 1979.
WATER TEMPERATURES: Maximum recorded 33.0°C July 19, 1977 minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 473 micromhos July 9; minimum, 207 micromhos July 11.
WATER TEMPERATURES: Maximum, 26.0°C July 9, 13; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
OCT											
29...	1230	1480	338	7.7	7.5	10.5	88	K1	K4	170	23
NOV											
26...	1300	2210	360	8.0	4.5	12.6	100	--	--	170	28
DEC											
30...	1100	--	422	8.0	1.0	13.6	96	<10	K11	180	29
JAN											
28...	1415	1820	398	8.0	.5	13.2	94	K70	K19	170	6
MAR											
03...	1245	3630	351	7.6	.5	13.0	92	K2	K2	160	12
APR											
13...	1315	3720	311	7.5	9.0	11.2	97	60	20	130	13
MAY											
27...	1300	3420	258	8.0	17.0	8.7	92	K270	43	150	10
JUN											
17...	1315	1390	333	8.1	20.5	9.5	106	73	26	160	21
JUL											
23...	1300	1210	357	8.2	21.5	9.3	106	60	K21	170	28
AUG											
25...	1030	1080	338	8.1	21.0	8.5	95	--	--	180	35
SEP											
24...	0930	978	337	8.4	14.5	10.0	100	--	--	180	34

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	PERCENT SODIUM	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
29...	46	14	9.8	.3	11	1.0	190	0	156	5.8	19
NOV											
26...	44	14	9.8	.3	11	1.1	190	0	156	3.0	19
DEC											
30...	47	15	11	.4	12	1.1	200	0	164	2.9	22
JAN											
28...	46	14	10	.3	11	1.1	200	0	164	3.2	--
MAR											
03...	42	13	9.9	.3	12	1.6	180	0	148	7.2	17
APR											
13...	35	11	8.1	.3	12	1.6	170	0	139	8.6	18
MAY											
27...	40	13	7.7	.3	11	1.3	170	0	140	2.5	16
JUN											
17...	43	13	9.7	.3	12	1.1	170	0	139	2.2	17
JUL											
23...	44	14	10	.3	11	1.1	180	0	148	1.8	19
AUG											
25...	47	14	11	.4	12	1.0	180	0	148	2.3	18
SEP											
24...	49	15	11	.4	11	.8	190	0	156	1.2	19

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04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)
OCT										
29...	19	.1	3.7	236	204	943	.18	.050	.06	.32
NOV										
26...	16	.1	2.6	214	191	1280	.10	.000	.00	.21
DEC										
30...	20	.1	5.1	230	213	--	.40	.030	.04	.22
JAN										
28...	--	--	7.2	--	--	--	.35	.090	.11	.30
MAR										
03...	17	.1	7.7	205	199	2010	.50	.130	--	.30
APR										
13...	15	.1	5.6	194	169	1950	.36	.070	--	--
MAY										
27...	16	.1	3.9	214	182	1980	.27	.080	--	.31
JUN										
17...	17	<.1	5.2	184	185	691	.23	.020	--	.55
JUL										
23...	18	.1	4.9	221	201	722	.20	.020	--	.38
AUG										
25...	18	.1	5.6	210	199	612	.04	.030	--	.55
SEP										
24...	18	.1	5.3	221	209	584	.10	.030	--	.43

DATE	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT										
29...	.37	.55	2.4	.020	.06	.010	6.8	15	60	100
NOV										
26...	.21	.31	1.4	.010	.03	.000	7.0	15	90	100
DEC										
30...	.25	.65	2.9	.040	.12	.000	6.1	--	--	--
JAN										
28...	.39	.74	3.3	.040	.12	.040	--	16	79	100
MAR										
03...	.43	.93	4.1	.030	.09	.010	5.9	33	323	100
APR										
13...	<.10	--	--	.030	.09	<.010	--	28	281	100
MAY										
27...	.39	.74	3.3	.020	.06	.010	9.0	28	259	100
JUN										
17...	.57	.80	3.5	<.010	.03	<.010	7.2	--	--	--
JUL										
23...	.40	.60	2.7	.030	.09	<.010	--	10	33	100
AUG										
25...	.58	.62	2.7	.050	.15	<.010	5.8	14	41	100
SEP										
24...	.46	.56	2.5	.040	.12	.020	--	10	26	100

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
JAN											
24...	1415	1	1	<50	30	1	<1	10	<10	3	1
APR											
13...	1315	1	1	100	20	3	--	<10	<10	1	0
JUL											
23...	1300	1	1	<50	20	1	--	20	20	2	1
SEP											
24...	0930	4	2	100	<50	1	<1	10	<10	2	2

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
JAN										
24...	3	1	270	10	55	2	10	7	.3	.3
APR										
13...	11	3	380	50	17	0	30	4	.3	<.1
JUL										
23...	5	2	210	10	2	2	40	1	<.1	<.1
SEP										
24...	8	2	160	10	4	4	40	<10	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
JAN										
24...	5	2	0	0	0	0	20	<4	5.0	.4
APR										
13...	9	2	0	0	0	0	30	<4	6.2	.3
JUL										
23...	27	3	0	0	<1	0	20	4	4.9	.2
SEP										
24...	<1	<1	<1	<1	<1	<1	170	<10	3.5	.4

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 26,80		MAR 3,81		APR 13,81		MAY 27,81	
TIME	1300		1245		1315		1300	
TOTAL CELLS/ML	1300		39		1200		1800	
DIVERSITY: DIVISION	0.9		0.9		1.6		1.0	
.CLASS	0.9		0.9		1.6		1.4	
..ORDER	1.6		1.6		2.1		2.1	
...FAMILY	1.7		1.6		2.5		3.4	
....GENUS	2.3		1.6		2.9		4.0	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	--	-	--	-	--	-	14	1
....TETRAEDRON	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	28	2
....SELENASTRUM	--	-	--	-	13	1	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	52	4	84	5
..TETRASPORALES								
...GLOEOCYSTACEAE								
....GLOEOCYSTIS	--	-	--	-	--	-	56	3
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	52	4	56	3
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	13	1	13#	33	--	-	56	3
....MELOSIRA	280#	22	--	-	180#	15	220	13
....STEPHANODISCUS	--	-	--	-	430#	36	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	170	10
....COCCONEIS	13	1	--	-	13	1	84	5
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	98	6
....CYMBELLA	13	1	--	-	--	-	150	9
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	42	2
....OPEPHORA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	500#	39	--	-	--	-	70	4
....FRAGILARIA	150	12	--	-	39	3	170	10
....SYNEDRA	13	1	--	-	--	-	14	1
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	13	1	--	-
...NAVICULACEAE								
....NAVICULA	--	-	13#	33	39	3	56	3
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	26	2	98	6
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	170	10
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	26	2	--	-	100	9	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	26	2	110	6

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 26,80 1300		MAR 3,81 1245		APR 13,81 1315		MAY 27,81 1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	13	1	13#	33	190#	16	14	1
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....APHANIZOMENON	250#	19	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
....SPIRULINA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	13	1	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...CERATIACEAE								
....CERATIUM	--	-	--	-	--	-	--	-

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 17,81	JUL 23,81	AUG 25,81	SEP 24,81
TIME	1315	1300	1030	0930
TOTAL CELLS/ML	260	710	4900	680
DIVERSITY: DIVISION	1.5	1.8	1.4	0.0
.CLASS	1.5	1.8	1.4	0.0
..ORDER	1.7	2.2	2.2	0.8
...FAMILY	2.7	3.2	2.7	1.9
....GENUS	2.8	3.3	3.5	1.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	26	10	13	2	55	1	--	-
....TETRAEDRON	13	5	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	210#	29	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	52#	20	26	4	82	2	--	-
..TETRASPORALES								
...GLOEOCYSTACEAE								
....GLOEOCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	13	5	13	2	41	1	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	41	1	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	13	2	41	1	--	-
....MELOSIRA	--	-	52	7	220	4	160#	24
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	*	0	--	-
....COCCONEIS	--	-	13	2	96	2	340#	50
....RHOICOSPHENIA	13	5	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	13	2	41	1	--	-
....CYMBELLA	--	-	--	-	55	1	68	10
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
....OPEPHORA	--	-	--	-	*	0	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	140	3	--	-
....FRAGILARIA	--	-	120#	16	920#	19	--	-
....SYNEDRA	--	-	--	-	--	-	41	6
...GOMPHONEMATACEAE								
....GOMPHONEMA	13	5	--	-	55	1	--	-
...NAVICULACEAE								
....NAVICULA	77#	30	26	4	69	1	--	-
...NITZSCHIACEAE								
....NITZSCHIA	13	5	77	11	96	2	68	10
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	39	15	66	9	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	26	4	27	1	--	-

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 17,81		JUL 23,81		AUG 25,81		SEP 24,81	
TIME	1315		1300		1030		0930	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	300	6	--	-
....ANACYSTIS	--	-	39	5	1400#	29	--	-
....GOMPHOSPHAERIA	--	-	--	-	470	9	--	-
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	270	6	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	230	5	--	-
....SPIRULINA	--	-	--	-	*	0	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	13	2	--	-	--	-
....TRACHELOMONAS	--	-	--	-	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...CERATIACEAE								
....CERATIUM	--	-	--	-	180	4	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

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04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	456	444	450	394	385	387	361	356	358	399	397	399
2	449	439	445	392	387	390	361	357	359	401	399	400
3	440	433	437	396	382	394	361	355	359	401	399	401
4	436	426	431	397	390	395	361	354	357	402	397	400
5	429	420	425	396	386	391	357	356	357	400	398	399
6	421	415	416	386	382	384	357	355	357	399	394	396
7	421	418	419	381	376	379	364	355	360	401	398	400
8	423	414	421	377	368	374	392	370	379	401	397	400
9	421	418	420	369	365	367	413	394	404	402	399	401
10	426	421	424	368	366	367	423	415	420	402	396	399
11	428	414	424	367	364	366	423	420	421	399	388	393
12	413	403	409	366	364	365	420	411	415	391	384	387
13	406	396	399	364	363	364	418	414	416	385	384	385
14	398	392	394	365	364	365	415	412	414	384	382	383
15	395	391	393	364	363	363	415	406	411	386	380	383
16	391	384	388	363	360	362	413	407	411	385	379	382
17	386	376	380	363	359	362	412	399	404	385	382	383
18	385	380	385	364	361	362	405	401	404	385	375	382
19	391	387	389	363	361	362	406	402	404	384	374	380
20	393	388	391	363	360	362	404	399	401	384	380	382
21	397	391	394	362	360	362	401	395	399	385	379	382
22	398	381	388	363	360	361	398	394	396	387	378	382
23	398	383	385	362	361	362	399	391	396	390	382	386
24	397	382	385	363	362	362	401	400	400	392	385	389
25	390	386	388	363	360	362	400	399	399	391	387	389
26	389	387	388	363	360	362	400	397	399	395	391	393
27	390	388	389	363	359	361	400	396	398	400	395	398
28	390	384	387	362	357	360	399	395	397	400	397	399
29	388	371	380	360	356	358	399	395	397	400	396	398
30	380	375	377	359	355	357	400	398	399	399	394	397
31	390	380	385	---	---	---	399	397	398	399	391	395
MONTH	456	371	403	397	355	369	423	354	393	402	374	392

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	395	388	392	373	349	362	338	336	336	341	333	337
2	396	392	393	374	342	364	339	335	336	338	332	335
3	392	391	391	375	300	358	336	336	335	342	334	339
4	392	388	391	352	304	323	340	336	337	347	343	333
5	391	386	389	362	352	356	335	336	336	361	352	342
6	398	385	390	357	352	355	344	336	339	370	359	366
7	397	388	395	357	350	354	342	336	339	371	367	369
8	390	386	388	359	352	356	341	335	339	371	366	368
9	391	387	389	359	354	357	355	341	348	371	368	370
10	391	387	390	357	352	355	357	343	350	372	366	369
11	397	391	395	355	349	352	359	348	352	368	362	365
12	398	395	397	357	349	353	349	344	347	370	364	367
13	400	391	396	353	344	349	357	303	329	366	359	362
14	406	373	390	355	342	348	313	306	311	359	354	356
15	414	407	410	354	346	353	321	311	317	355	351	353
16	421	414	417	350	343	347	324	310	314	352	349	351
17	432	420	426	349	339	345	345	309	328	347	343	345
18	432	420	426	344	338	341	354	341	345	343	342	331
19	437	421	430	342	334	340	343	340	341	341	338	339
20	451	436	441	347	342	344	355	351	341	338	334	336
21	450	378	415	355	341	346	355	354	345	340	334	337
22	379	354	366	356	341	347	347	324	337	337	333	335
23	354	340	348	354	341	346	327	324	325	333	330	332
24	361	329	345	352	340	345	325	317	320	329	326	327
25	357	343	349	346	334	344	320	314	317	328	325	326
26	368	345	355	349	341	345	317	312	315	332	324	329
27	365	352	357	353	338	347	322	312	318	326	304	319
28	363	345	351	346	336	340	334	320	328	329	300	322
29	---	---	---	340	336	337	337	329	332	330	311	321
30	---	---	---	349	341	344	337	334	315	334	316	328
31	---	---	---	357	338	347	---	---	---	329	312	322
MONTH	451	329	390	375	300	349	359	303	332	372	300	343

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	332	315	325	306	290	294	383	369	376	297	285	293
2	319	310	314	300	287	295	384	378	381	300	277	290
3	334	312	327	303	289	298	384	380	382	285	278	282
4	329	313	321	311	299	306	387	378	383	296	287	291
5	337	313	328	300	287	294	391	383	387	302	293	297
6	336	328	332	282	274	277	393	388	390	309	302	306
7	326	316	320	268	243	256	398	388	393	316	301	307
8	327	310	319	253	228	244	394	387	391	307	300	303
9	313	309	311	473	229	318	393	368	382	307	302	305
10	328	313	321	388	256	324	373	354	367	315	303	308
11	327	321	324	---	---	---	338	293	304	324	310	316
12	323	311	317	251	207	229	308	286	297	323	313	318
13	328	309	320	323	255	288	327	287	306	320	314	317
14	329	322	326	368	277	286	308	292	300	323	311	316
15	327	322	324	389	374	377	323	295	314	349	325	337
16	328	320	324	377	347	369	319	307	315	349	338	345
17	333	313	322	355	332	346	318	305	310	355	342	348
18	317	310	314	356	342	350	332	318	326	367	356	362
19	307	293	300	339	326	333	324	315	320	369	356	366
20	308	292	302	348	334	340	318	280	309	368	357	363
21	336	300	317	349	342	346	293	276	284	371	367	369
22	349	298	326	338	332	335	299	279	286	373	343	368
23	366	335	351	361	332	345	337	286	317	337	325	329
24	370	357	366	426	362	398	345	332	339	336	331	333
25	354	333	340	421	379	403	352	331	341	---	---	---
26	330	326	329	403	325	376	346	304	330	---	---	---
27	327	322	325	323	319	321	304	297	301	---	---	---
28	322	306	316	332	319	324	340	300	322	---	---	---
29	304	298	301	354	333	345	333	289	306	---	---	---
30	318	300	311	382	354	370	313	290	300	---	---	---
31	---	---	---	378	371	374	299	295	297	---	---	---
MONTH	370	292	322				398	276	334			

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.5	17.0	17.5	7.5	6.5	7.0	4.5	4.5	4.5	.5	.5	.5
2	17.0	16.5	17.0	7.5	6.0	6.5	4.5	2.0	3.5	.5	.5	.5
3	16.5	15.0	16.0	8.5	7.5	8.0	2.0	.5	1.5	.5	.5	.5
4	15.0	14.0	14.5	8.5	7.5	8.5	2.0	1.0	1.5	.5	.0	.5
5	14.0	14.0	14.0	7.5	6.5	7.5	3.5	2.0	3.0	.5	.5	.5
6	13.5	12.0	13.0	8.0	6.5	7.5	4.0	3.5	3.5	.5	.0	.5
7	14.0	11.5	13.0	8.0	7.5	8.0	4.5	4.0	4.5	.5	.0	.0
8	16.0	13.5	14.5	8.0	7.5	7.5	4.5	4.0	4.5	.5	.0	.0
9	15.0	13.5	14.0	8.5	7.5	8.0	4.0	3.5	3.5	.0	.0	.0
10	14.0	12.5	13.5	8.0	6.0	7.0	3.5	2.0	3.0	.0	.0	.0
11	13.0	11.5	12.5	6.5	5.5	6.0	2.0	1.5	2.0	.5	.0	.0
12	12.0	10.5	11.5	5.5	5.0	5.0	3.0	1.5	2.5	.0	.0	.0
13	12.5	10.5	11.5	7.0	5.0	6.0	3.0	1.5	2.0	.0	.0	.0
14	11.0	10.0	10.5	7.5	6.5	7.0	1.5	.0	1.0	.0	.0	.0
15	10.5	10.0	10.5	6.5	6.0	6.0	1.0	.0	.5	.0	.0	.0
16	12.0	10.5	11.5	6.0	5.5	6.0	1.5	.5	1.0	.0	.0	.0
17	13.0	12.0	12.5	5.5	5.5	5.5	.5	.0	.0	.0	.0	.0
18	12.5	10.5	11.5	5.5	5.0	5.5	1.5	.5	1.0	.0	.0	.0
19	11.0	10.5	11.0	5.0	4.0	5.0	.0	.0	.0	.5	.0	.0
20	11.0	10.5	11.0	5.5	5.0	5.0	.0	.0	.0	1.5	.0	1.0
21	11.0	10.0	10.5	5.5	5.0	5.5	.0	.0	.0	1.0	1.0	1.0
22	11.0	10.0	10.5	5.5	4.5	5.0	.0	.0	.0	1.5	.5	1.0
23	10.5	9.5	10.0	5.5	5.0	5.0	1.0	.0	.5	2.0	1.0	1.5
24	10.5	10.0	10.5	5.5	5.0	5.5	.5	.5	.5	1.5	.5	1.0
25	10.5	9.0	10.0	5.0	4.5	5.0	.5	.5	.5	2.0	1.0	1.5
26	9.0	7.5	8.0	5.0	4.0	4.5	.5	.5	.5	2.0	1.5	1.5
27	8.5	7.5	8.0	5.0	4.0	4.5	.5	.5	.5	2.0	1.0	1.5
28	8.5	8.0	8.0	4.5	4.0	4.5	.5	.5	.5	1.5	1.0	1.0
29	8.0	7.0	7.5	4.5	4.5	4.5	.5	.5	.5	1.0	.0	.5
30	7.5	7.0	7.5	5.0	4.0	4.5	.5	.5	.5	1.0	.0	.5
31	8.0	7.5	7.5	---	---	---	.5	.5	.5	.5	.0	.0
MONTH	18.5	7.0	11.5	8.5	4.0	6.0	4.5	.0	1.5	2.0	.0	.5

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	.0	.5	1.5	1.5	1.5	9.0	7.0	8.0	12.5	11.0	11.5
2	1.0	.0	.5	2.0	1.0	1.0	8.5	6.0	7.5	12.5	10.5	12.0
3	.0	.0	.0	2.0	.5	1.5	9.0	8.0	8.5	13.5	11.5	12.5
4	.0	.0	.0	2.5	1.5	2.0	10.5	9.0	9.5	14.5	13.5	12.0
5	.0	.0	.0	2.5	1.5	2.0	9.0	6.0	7.0	15.0	13.0	14.0
6	.0	.0	.0	2.5	1.0	2.0	8.5	6.0	7.5	14.0	12.0	13.0
7	.0	.0	.0	2.5	1.0	1.5	11.0	8.0	9.5	14.0	12.5	13.5
8	.0	.0	.0	3.0	2.0	2.5	10.5	8.5	9.5	14.0	12.5	13.5
9	.0	.0	.0	3.0	2.0	2.5	10.5	8.5	9.5	14.5	13.0	14.0
10	.0	.0	.0	3.0	2.0	2.5	10.5	8.5	9.0	14.5	11.0	13.0
11	.0	.0	.0	3.0	1.5	2.0	10.5	9.0	9.5	11.0	10.5	11.0
12	.0	.0	.0	4.0	1.5	3.0	10.5	9.0	9.5	13.0	10.5	11.5
13	.0	.0	.0	4.0	2.5	3.5	10.5	9.0	9.5	13.5	12.5	13.0
14	.0	.0	.0	3.0	1.5	2.5	11.0	9.5	10.5	13.0	12.0	12.5
15	.0	.0	.0	4.5	3.0	3.5	10.5	9.0	10.0	13.0	12.0	12.5
16	1.5	.0	.0	4.0	3.0	3.5	10.5	9.0	10.0	15.5	12.0	13.5
17	3.5	2.0	3.0	4.0	3.0	3.5	12.5	10.5	11.5	14.5	13.0	13.5
18	3.0	2.5	3.0	3.0	2.0	2.5	12.5	11.0	11.5	14.5	13.5	14.0
19	2.5	1.5	2.0	2.0	1.5	2.0	12.5	10.5	11.0	16.5	13.5	15.0
20	2.5	1.5	2.0	3.0	2.0	2.5	11.5	9.5	10.5	16.5	14.5	15.5
21	2.5	1.5	2.0	4.0	2.5	3.5	11.5	9.5	11.0	18.5	14.5	16.5
22	2.5	1.5	2.0	5.0	3.5	4.0	11.5	10.5	11.0	18.5	15.5	17.0
23	2.5	2.0	2.5	5.0	3.5	4.5	11.0	10.5	11.0	18.5	16.0	17.0
24	2.5	1.5	2.0	5.0	4.0	4.5	11.0	9.5	10.0	17.0	15.5	16.5
25	2.5	1.5	2.0	6.0	4.0	5.0	11.0	10.0	10.5	17.5	16.5	17.0
26	2.5	1.5	2.0	5.5	5.0	5.5	11.0	10.0	10.5	17.5	17.0	17.5
27	2.0	1.0	1.5	7.0	5.5	6.0	12.5	10.0	11.0	18.0	17.0	17.0
28	2.0	1.5	1.5	6.5	6.0	6.5	12.5	11.5	12.0	20.0	17.0	18.0
29	---	---	---	7.5	7.0	7.0	12.5	11.5	12.0	18.0	17.0	17.5
30	---	---	---	8.0	7.5	8.0	12.5	11.0	11.5	19.0	17.0	17.5
31	---	---	---	9.0	6.5	8.0	---	---	---	18.5	17.0	17.5
MONTH	3.5	.0	1.0	9.0	.5	3.5	12.5	6.0	10.0	20.0	10.5	14.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.0	16.5	17.5	22.5	20.5	21.5	24.5	20.5	22.0	22.0	20.5	21.0
2	18.5	17.0	17.5	22.5	20.5	21.5	22.5	21.0	22.0	21.5	20.5	21.0
3	20.0	17.0	18.5	23.5	21.0	22.0	23.0	20.0	21.0	21.0	20.5	20.5
4	18.5	17.0	17.5	24.0	21.5	22.5	23.0	21.5	22.5	22.0	19.5	21.0
5	22.0	17.5	19.5	23.0	21.5	22.0	22.5	20.5	21.5	21.0	20.0	20.5
6	22.0	19.5	20.5	25.0	21.0	22.5	23.0	21.0	22.0	21.0	19.5	20.0
7	21.0	18.5	19.0	24.0	22.0	23.0	22.5	21.5	22.0	21.0	18.5	19.5
8	19.0	18.0	18.5	25.0	22.0	23.5	23.0	21.0	21.5	21.0	18.5	19.5
9	18.5	17.0	18.0	26.0	23.0	24.0	23.5	20.0	21.5	20.0	17.5	18.5
10	22.5	18.0	19.5	25.5	21.0	23.0	24.0	21.5	22.5	21.5	18.0	19.5
11	22.5	18.0	20.0	24.0	22.0	22.5	23.5	21.0	22.0	22.0	18.5	20.0
12	21.5	18.5	19.5	25.0	21.5	22.5	23.5	21.0	22.0	22.5	20.0	21.0
13	20.5	19.0	20.0	26.0	22.5	24.0	23.5	21.5	22.5	21.5	18.0	20.0
14	22.0	18.5	19.5	25.0	22.5	23.5	22.5	20.5	22.0	22.0	19.0	20.0
15	23.0	20.5	21.5	22.5	20.5	22.0	23.0	20.5	21.5	19.5	18.0	18.5
16	21.5	18.5	20.0	22.5	19.5	21.0	23.0	20.0	21.5	18.0	16.5	17.0
17	20.5	18.0	18.5	24.0	21.0	22.0	23.0	19.5	21.0	16.0	15.0	15.5
18	21.0	19.0	19.5	24.0	21.5	22.5	23.0	19.5	21.5	15.5	14.0	15.0
19	20.5	19.0	19.5	23.0	22.0	22.5	23.5	19.5	21.5	17.5	14.5	16.0
20	21.0	18.5	19.5	23.0	21.5	22.0	23.5	20.0	21.5	16.5	15.0	16.0
21	19.5	18.0	18.5	22.5	21.0	21.5	23.0	20.5	22.0	15.0	13.5	14.0
22	19.0	18.5	19.0	22.5	18.5	20.5	23.0	21.0	22.0	15.0	12.0	13.5
23	21.0	18.5	19.0	22.0	20.0	21.0	24.0	19.5	21.5	15.0	14.0	14.5
24	21.0	19.0	19.5	22.5	20.0	21.0	23.0	20.0	22.0	14.5	14.5	14.5
25	21.0	18.5	19.0	23.5	21.5	22.5	23.5	21.0	22.0	---	---	---
26	22.5	18.0	20.0	24.0	22.0	23.0	23.0	22.0	22.5	---	---	---
27	22.0	18.0	20.0	22.0	20.0	21.0	22.0	21.0	21.5	---	---	---
28	20.5	18.5	19.5	20.0	18.0	18.5	22.0	20.5	21.5	---	---	---
29	22.5	18.5	20.5	22.0	17.0	19.5	22.5	21.5	22.0	---	---	---
30	22.5	20.5	21.5	23.0	19.0	21.0	23.5	20.5	22.0	---	---	---
31	---	---	---	23.5	19.0	21.5	22.0	20.5	21.5	---	---	---
MONTH	23.0	16.5	19.5	26.0	17.0	22.0	24.5	19.5	22.0			

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW¼ NW¼ sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi (2.4 km) upstream from Little Bear Creek, and 3.9 mi (6.3 km) northeast of Muskegon.

DRAINAGE AREA.--14.8 mi² (38.3 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-80-1: 1976 (M), 1978 (M), 1979 (P).

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft (179.832 m) Michigan Department of Natural Resources datum. Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation during low flow by dams and irrigation above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 16.0 ft³/s (0.453 m³/s), 14.68 in/yr (373 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 930 ft³/s (26.3 m³/s) Mar. 5, 1976, gage height, 11.00 ft (3.353 m), datum then in use; minimum, 1.0 ft³/s (0.028 m³/s) Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 19	0400	*275	7.79	*15.32	4.670	Apr. 14	1200	186	5.27	14.70	4.481
Apr. 9	1100	102	2.89	13.78	4.200	May 11	2100	123	3.48	13.97	4.258

Minimum discharge, 3.5 ft³/s (0.099 m³/s) Aug. 20; minimum gage height, 10.29 ft (3.136 m) Aug. 20, 21, 22, 23, 24, 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	17	20	14	15	40	18	24	11	15	4.6	16
2	17	16	20	13	15	34	15	22	10	12	4.5	7.7
3	31	16	18	13	15	29	14	21	11	10	5.5	6.6
4	25	24	16	13	15	28	15	20	9.5	9.0	5.2	6.0
5	19	24	15	13	15	27	14	27	9.9	8.3	4.6	5.5
6	16	20	21	13	15	24	13	25	9.2	7.8	4.3	5.5
7	16	19	48	12	15	22	13	21	8.5	7.1	4.5	5.9
8	15	18	53	12	15	22	20	19	14	6.6	4.6	8.5
9	15	18	51	12	15	21	74	16	15	6.3	4.3	6.0
10	15	17	35	12	15	21	41	22	13	6.0	4.2	5.5
11	15	15	30	12	15	20	58	80	11	5.8	4.8	5.2
12	14	15	22	12	15	20	48	74	9.3	6.4	4.3	4.8
13	14	16	22	12	16	19	40	41	9.9	7.6	4.4	4.7
14	15	28	19	12	17	18	119	32	24	5.6	4.5	4.7
15	17	25	17	11	18	18	66	30	20	5.9	6.6	4.6
16	23	21	15	11	20	17	42	26	17	6.1	5.0	4.8
17	32	18	15	11	25	17	38	23	13	5.4	4.2	6.4
18	36	18	14	11	73	16	32	21	11	5.5	3.9	5.8
19	26	16	14	11	226	15	32	20	9.4	5.8	4.1	5.4
20	20	15	14	11	140	16	35	18	15	6.0	3.7	4.9
21	22	14	14	11	88	16	28	17	26	6.2	3.8	6.1
22	21	13	14	12	66	16	26	16	27	5.5	3.9	7.2
23	16	14	15	12	76	15	33	15	19	5.1	3.9	5.6
24	19	16	13	12	71	15	39	18	15	4.9	3.8	5.4
25	39	15	13	12	52	14	30	18	13	4.8	3.7	6.3
26	39	13	13	15	41	15	27	14	11	5.0	4.9	13
27	29	13	14	16	36	16	26	13	10	4.3	6.3	9.2
28	23	15	15	16	46	15	26	12	9.0	6.6	8.0	7.3
29	21	19	14	17	---	14	32	12	8.9	6.4	6.2	6.9
30	19	18	14	18	---	19	27	13	18	5.1	5.4	30
31	19	---	15	15	---	23	---	12	---	4.8	5.0	---
TOTAL	664	526	633	397	1191	622	1041	742	407.6	206.9	146.7	221.5
MEAN	21.4	17.5	20.4	12.8	42.5	20.1	34.7	23.9	13.6	6.67	4.73	7.38
MAX	39	28	53	18	226	40	119	80	27	15	8.0	30
MIN	14	13	13	11	15	14	13	12	8.5	4.3	3.7	4.6
CFSM	1.45	1.18	1.38	.87	2.87	1.36	2.35	1.62	.92	.45	.32	.50
IN.	1.67	1.32	1.59	1.00	2.99	1.56	2.62	1.86	1.02	.52	.37	.56

CAL YR 1980 TOTAL 6387.5 MEAN 17.5 MAX 286 MIN 3.8 CFSM 1.18 IN 16.05
WTR YR 1981 TOTAL 6798.7 MEAN 18.6 MAX 226 MIN 3.7 CFSM 1.26 IN 17.09

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE¼ NW¼ sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft (9 m) downstream from bridge on Fruitvale Road, 6.3 mi (10.1 km) downstream from North Branch, and 6.9 mi (11.1 km) northeast of Whitehall.

DRAINAGE AREA.--380 mi^2 (980 km^2), approximately.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft (181.1 m) National Geodetic Vertical Datum of 1929. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation during low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 425 ft^3/s (12.04 m^3/s), 15.19 in/yr (386 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft^3/s (153 m^3/s) Sept. 1, 1975, gage height, 7.46 ft (2.274 m); minimum, 163 ft^3/s (4.62 m^3/s) Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,300 ft^3/s (36.8 m^3/s) Feb 20, gage height, 5.05 ft (1.539 m); minimum, 227 ft^3/s (6.43 m^3/s) Aug. 24, 26, gage height, 1.39 ft (0.424 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	407	431	422	380	370	846	503	472	354	315	250	303
2	398	422	435	370	370	834	498	454	345	311	243	301
3	398	417	430	360	370	738	474	435	345	301	251	287
4	398	430	407	350	360	674	456	420	344	296	253	277
5	398	452	433	350	360	624	444	424	338	294	250	268
6	392	468	426	350	360	582	437	430	325	287	247	263
7	385	452	460	350	360	544	426	430	324	268	268	263
8	381	435	544	350	360	516	426	419	351	272	271	275
9	375	431	674	350	360	496	491	405	370	267	273	278
10	367	428	727	350	360	494	667	403	369	259	264	265
11	367	419	674	340	370	501	826	460	351	258	255	261
12	367	410	615	340	380	496	765	565	334	260	248	255
13	367	407	550	340	400	489	758	663	328	265	244	248
14	376	428	482	340	420	494	758	630	334	260	242	249
15	430	476	420	340	450	482	850	585	335	257	264	242
16	523	506	410	340	500	478	880	526	345	262	272	240
17	579	482	400	340	600	478	769	464	344	262	263	243
18	624	452	390	340	700	466	695	437	335	259	253	256
19	654	433	380	340	834	450	651	417	321	271	247	255
20	606	422	370	350	1190	439	591	403	318	269	241	251
21	547	417	370	350	1220	433	547	392	344	268	236	256
22	511	410	360	350	1070	433	508	379	364	265	232	298
23	489	408	360	360	977	442	496	372	369	255	230	302
24	468	413	360	360	1040	444	513	372	351	257	228	289
25	476	417	360	370	1050	442	550	392	334	252	229	282
26	516	410	360	370	991	440	544	397	322	250	231	328
27	550	403	360	380	905	446	513	390	311	246	248	362
28	531	405	360	390	846	450	486	376	302	256	275	346
29	494	415	370	380	---	444	474	366	298	271	307	322
30	462	420	380	380	---	454	474	367	308	268	320	352
31	442	---	390	370	---	476	---	363	---	259	295	---
TOTAL	14278	12919	13679	11030	17573	16025	17470	13608	10113	8340	7930	8417
MEAN	461	431	441	356	628	517	582	439	337	269	256	281
MAX	654	506	727	390	1220	846	880	663	370	315	320	362
MIN	367	403	360	340	360	433	426	363	298	246	228	240
CFSM	1.21	1.13	1.16	.94	1.65	1.36	1.53	1.16	.89	.71	.67	.74
IN.	1.40	1.26	1.34	1.08	1.72	1.57	1.71	1.33	.99	.82	.78	.82

CAL YR 1980 TOTAL 159723 MEAN 436 MAX 1650 MIN 234 CFSM 1.15 IN 15.64
WTR YR 1981 TOTAL 151382 MEAN 415 MAX 1220 MIN 228 CFSM 1.09 IN 14.82

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW¼ NW¼ sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft (6 m) upstream from highway bridge at south edge of Scottville, 1.4 mi (2.3 km) upstream from India Creek and 5.6 mi (9.0 km) downstream from Big South Branch.

DRAINAGE AREA.--681 mi² (1,764 km²), revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft (182.167 m) National Geodetic Vertical Datum of 1929. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi (7.2 km) upstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation at low flow.

AVERAGE DISCHARGE.--42 years, 661 ft³/s (18.72 m³/s), 13.18 in/yr (335 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft³/s (84.1 m³/s) July 1, 1969, gage height, 6.26 ft (1.908 m); minimum, 209 ft³/s (5.92 m³/s) Dec. 11, 1962, discharge measurement; minimum daily, 310 ft³/s (8.78 m³/s) Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,890 ft³/s (53.5 m³/s) Feb. 25, gage height, 4.71 ft (1.436 m); maximum gage height, 5.28 ft (1.609 m) Feb. 3, backwater from ice; minimum discharge 358 ft³/s (10.1 m³/s) Aug. 25, 26, gage height, 1.56 ft (0.475 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	847	756	666	640	640	1460	847	951	587	470	387	446
2	792	736	686	640	640	1430	850	911	572	482	378	428
3	750	718	690	640	630	1370	840	831	566	468	378	418
4	715	718	676	640	620	1250	840	770	563	455	381	408
5	694	718	718	640	620	1130	820	770	557	446	380	400
6	673	729	686	640	630	1050	790	760	551	455	378	399
7	652	722	722	650	640	990	750	753	539	440	390	402
8	634	708	781	650	640	933	780	725	542	425	407	435
9	617	704	863	650	630	891	1180	697	551	415	438	440
10	605	701	938	640	620	867	1340	690	569	408	434	432
11	599	690	975	640	610	859	1300	736	554	401	413	412
12	599	676	920	640	600	851	1220	811	536	406	397	400
13	599	673	780	650	600	835	1100	903	524	413	388	390
14	620	708	700	650	620	827	1200	942	527	408	387	381
15	711	746	660	650	660	819	1300	887	536	399	425	374
16	788	792	640	660	720	803	1250	811	542	406	450	369
17	891	792	620	660	800	803	1130	760	533	418	450	374
18	933	760	610	660	930	792	1050	722	524	446	415	389
19	928	732	610	660	1160	778	980	690	506	446	396	397
20	911	711	610	670	1340	756	910	666	500	433	384	391
21	887	694	620	670	1490	739	880	645	506	428	374	422
22	847	680	620	660	1580	739	819	627	536	425	369	493
23	819	680	620	660	1740	750	803	614	560	415	366	546
24	795	683	620	670	1850	756	823	634	560	404	364	523
25	811	676	630	670	1880	756	867	655	533	394	362	492
26	831	673	630	680	1820	756	895	669	506	390	360	560
27	859	659	640	680	1660	764	867	659	488	385	372	598
28	867	659	640	660	1540	764	859	624	476	392	408	606
29	839	666	640	640	---	778	883	608	468	409	486	559
30	807	666	640	634	---	781	928	599	470	419	481	561
31	781	---	640	638	---	799	---	599	---	402	455	---
TOTAL	23701	21226	21491	20232	27910	27876	29101	22719	15982	13103	12453	13445
MEAN	765	708	693	653	997	899	970	733	533	423	402	448
MAX	933	792	975	680	1880	1460	1340	951	587	482	486	606
MIN	599	659	610	634	600	739	750	599	468	385	360	369
CFSM	1.12	1.04	1.02	.96	1.46	1.32	1.42	1.08	.78	.62	.59	.66
IN.	1.29	1.16	1.17	1.11	1.52	1.52	1.59	1.24	.87	.72	.68	.73

CAL YR 1980 TOTAL 262411 MEAN 717 MAX 1490 MIN 420 CFSM 1.05 IN 14.33
WTR YR 1981 TOTAL 249239 MEAN 683 MAX 1880 MIN 360 CFSM 1.00 IN 13.61

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: May 1968 to current year.

INSTRUMENTATION.--Temperature recorder since May 1968.

REMARKS.--Temperature recorder clock stopped Dec. 6-16 (range in temperature 0.0 to 3.0°C), Apr. 2-20 (range in temperature 6.0 to 12.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 21.5°C July 6, 7, 10; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBFR		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.5	13.5	5.5	5.0	2.5	2.5	.0	.0	.0	.0	1.5	1.5
2	13.5	13.5	5.0	4.0	2.0	1.0	.0	.0	.0	.0	1.5	1.0
3	13.5	12.5	6.5	4.5	1.0	1.0	.0	.0	.0	.0	1.0	.5
4	12.5	10.5	6.5	6.5	1.0	1.0	.0	.0	.0	.0	2.0	1.0
5	10.5	10.0	6.5	6.0	1.0	.5	.0	.0	.0	.0	2.0	1.5
6	10.0	9.0	6.0	5.5	---	---	.0	.0	.0	.0	2.0	1.5
7	9.0	9.0	6.0	6.0	---	---	.0	.0	.0	.0	2.0	1.5
8	9.0	9.0	6.0	5.0	---	---	.0	.0	.0	.0	3.0	1.5
9	9.0	8.0	6.0	5.0	---	---	.0	.0	.0	.0	4.0	2.5
10	8.5	8.0	5.5	4.5	---	---	.0	.0	.0	.0	4.0	3.5
11	8.5	8.0	4.5	4.0	---	---	.0	.0	.0	.0	3.5	3.0
12	8.0	7.5	4.0	3.0	---	---	.0	.0	.0	.0	4.5	2.5
13	7.5	7.0	3.5	3.0	---	---	.0	.0	.0	.0	4.5	3.5
14	7.0	5.0	4.0	3.5	---	---	.0	.0	.0	.0	3.5	2.0
15	5.5	5.0	4.0	4.0	---	---	.0	.0	.0	.0	4.5	3.0
16	6.5	5.5	4.0	4.0	---	---	.0	.0	.0	.0	4.5	2.5
17	8.0	6.5	4.0	3.5	.0	.0	.0	.0	.0	.0	4.0	3.0
18	8.0	7.5	3.5	2.5	.0	.0	.0	.0	.0	.0	3.0	2.0
19	7.5	7.0	2.5	2.5	.0	.0	.0	.0	.0	.0	2.0	1.0
20	7.0	6.5	2.5	2.5	.0	.0	.0	.0	.0	.0	2.0	1.0
21	6.5	6.0	2.5	2.5	.0	.0	.0	.0	.0	.0	4.0	2.0
22	6.0	5.0	3.0	2.5	.0	.0	.0	.0	.0	.0	5.0	3.0
23	5.5	5.0	3.5	3.0	.0	.0	.0	.0	.5	.0	5.5	3.5
24	6.0	5.0	3.5	3.5	.0	.0	.0	.0	1.0	.5	6.0	4.0
25	6.0	5.5	3.5	3.5	.0	.0	.0	.0	1.0	1.0	6.5	4.5
26	5.5	4.0	3.5	2.0	.0	.0	.0	.0	1.0	1.0	6.5	5.5
27	4.0	4.0	2.0	2.0	.0	.0	.0	.0	1.0	1.0	7.5	5.0
28	4.0	4.0	2.0	2.0	.0	.0	.0	.0	1.5	1.0	8.0	6.0
29	4.0	4.0	2.0	2.0	.0	.0	.0	.0	---	---	8.5	8.0
30	4.5	4.0	2.5	2.0	.0	.0	.0	.0	---	---	9.0	8.5
31	5.5	4.5	---	---	.0	.0	.0	.0	---	---	11.5	8.5
MONTH	13.5	4.0	6.5	2.0			.0	.0	1.5	.0	11.5	.5

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	11.5	9.0	13.0	11.0	17.5	15.0	21.0	19.0	20.0	18.0	17.5	17.5
2	---	---	12.0	9.5	17.5	16.0	21.0	19.5	20.0	19.0	17.5	17.0
3	---	---	13.5	10.5	18.0	16.5	20.5	19.0	20.0	18.5	17.0	16.0
4	---	---	16.0	12.5	18.0	16.5	21.0	19.5	19.5	19.0	17.0	16.0
5	---	---	16.5	14.5	18.5	16.0	21.0	19.0	19.0	18.0	17.0	16.5
6	---	---	14.5	12.0	19.0	17.5	21.5	19.0	19.0	18.0	16.5	16.0
7	---	---	14.5	12.0	19.0	17.5	21.5	19.0	19.0	18.5	16.0	15.5
8	---	---	14.5	12.0	18.0	17.5	21.0	20.0	19.0	18.0	16.0	15.5
9	---	---	15.0	12.5	17.5	16.5	21.0	20.5	19.0	17.5	15.5	14.0
10	---	---	15.0	11.0	18.0	17.5	21.5	18.5	19.0	18.0	16.0	15.0
11	---	---	11.0	9.5	18.5	17.0	20.5	18.5	19.5	18.0	17.0	15.5
12	---	---	11.5	8.0	19.5	17.5	18.5	18.0	19.5	18.0	17.0	16.5
13	---	---	13.0	9.5	19.5	18.5	20.5	18.0	19.5	17.5	16.5	15.5
14	---	---	13.5	11.5	19.5	18.5	20.5	18.5	19.5	18.5	16.5	16.0
15	---	---	13.5	11.5	19.5	19.5	19.5	17.5	18.5	18.0	16.0	15.0
16	---	---	15.0	12.0	19.5	19.0	17.5	17.0	18.0	16.5	15.5	14.5
17	---	---	15.0	13.0	19.0	17.0	18.0	17.0	18.0	16.0	14.5	13.5
18	---	---	15.0	12.5	19.0	17.5	18.5	17.5	17.0	15.0	13.5	11.5
19	---	---	15.0	14.0	19.0	17.5	18.5	18.5	16.5	15.0	12.5	11.5
20	---	---	15.5	13.0	19.0	17.0	19.0	18.5	17.0	15.5	12.5	12.0
21	9.5	7.0	17.0	14.0	17.5	16.5	18.5	17.5	17.0	16.0	12.5	11.0
22	9.5	8.5	17.0	15.0	17.5	17.0	17.5	16.0	17.0	16.0	11.0	10.0
23	9.5	8.5	17.5	16.0	18.5	16.5	17.5	16.5	17.5	16.5	10.5	9.5
24	9.5	7.5	17.5	16.5	19.0	18.0	18.5	17.0	17.5	16.5	10.5	10.0
25	10.0	8.0	18.0	16.5	19.5	18.0	20.0	18.5	18.0	17.0	11.5	10.5
26	10.5	8.5	18.5	16.5	19.5	17.5	20.0	19.5	18.0	17.5	13.0	11.5
27	10.5	8.0	18.5	17.0	19.5	17.0	19.5	17.5	17.5	17.0	13.0	13.0
28	11.0	10.0	18.0	16.0	19.5	18.0	17.5	16.0	17.0	16.5	13.0	12.0
29	12.5	10.0	18.0	16.5	20.0	19.5	17.5	15.0	17.5	16.5	12.0	11.5
30	13.0	10.5	18.0	16.5	21.0	20.0	18.0	16.0	18.0	17.0	12.0	11.5
31	---	---	17.5	15.0	---	---	19.0	17.0	18.0	17.0	---	---
MONTH			18.5	8.0	21.0	15.0	21.5	15.0	20.0	15.0	17.5	9.5

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE¼ NE¼ sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft (76 m) upstream from Wheeler Creek, 0.9 mi (1.4 km) north of Sherman, and at mile 60.8 (97.8 km).

DRAINAGE AREA.--900 mi² (2,331 km²).

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(m). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft (245 m), from river-profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--61 years (water years 1904-15, 1931, 1934-81), 1,055 ft³/s (29.88 m³/s), 15.92 in/yr (404 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft³/s (101 m³/s) Mar. 25, 1913, gage height, 7.1 ft (2.16 m), from graph based on gage readings, datum then in use; minimum daily, 540 ft³/s (15.3 m³/s) Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,680 ft³/s (47.6 m³/s) Apr. 28, gage height, 12.95 ft (3.947 m); maximum gage height, 13.25 ft (4.039 m) Feb. 2, backwater from ice; minimum discharge, 643 ft³/s (18.2 m³/s) Aug. 7, gage height, 10.30 ft (3.139 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	847	838	865	970	940	1220	1610	1630	898	900	739	766
2	844	856	925	960	950	1440	1600	1500	925	860	733	781
3	934	871	904	960	960	1370	1560	1400	931	830	703	796
4	946	865	889	960	960	1340	1510	1220	937	820	694	799
5	934	895	895	960	960	1260	1470	1200	925	810	703	799
6	910	904	925	964	960	1180	1400	1190	916	800	682	781
7	895	895	955	960	950	976	1330	1150	886	800	656	781
8	883	892	1060	960	950	1060	1330	1120	865	800	691	811
9	820	880	1160	960	950	1070	1410	1070	853	790	727	820
10	838	868	1150	940	950	1070	1500	1160	850	790	805	820
11	871	874	1040	940	950	1100	1480	1120	835	780	835	790
12	886	880	1010	960	950	1090	1120	1120	847	780	880	760
13	904	889	1010	980	960	1050	1140	1110	847	805	934	757
14	895	904	988	980	980	1070	1130	1120	850	745	967	751
15	940	931	960	980	990	1090	1220	988	860	724	1010	739
16	949	949	940	980	1000	1080	1220	1050	880	733	1060	760
17	931	928	940	980	1100	1070	1180	1110	870	739	1030	787
18	895	898	940	990	1280	1060	1190	1000	860	787	910	766
19	883	901	940	990	1400	1040	1190	955	850	808	841	760
20	904	901	940	990	1420	1030	1180	961	840	820	799	772
21	895	910	940	1000	1320	1020	1100	940	840	775	778	751
22	901	901	950	1000	1260	1020	1070	952	900	760	802	760
23	895	919	950	1000	1330	1020	1080	952	930	736	802	745
24	895	925	950	988	1440	1030	1180	1000	890	700	799	742
25	895	922	950	982	1460	1040	1220	937	853	679	745	745
26	898	898	960	964	1380	1170	1200	922	859	703	757	754
27	910	886	960	949	1270	1230	1220	979	859	727	778	766
28	895	865	960	958	1410	1230	1430	988	862	733	760	787
29	862	871	970	985	---	1300	1650	973	865	751	763	793
30	850	868	970	880	---	1500	1630	934	832	733	775	796
31	835	---	970	889	---	1530	---	916	---	748	736	---
TOTAL	27640	26784	29966	29959	31430	35756	39550	33661	26215	23966	24894	23235
MEAN	892	893	967	966	1123	1153	1318	1086	874	773	803	775
MAX	949	949	1160	1000	1460	1530	1650	1630	937	900	1060	820
MIN	820	838	865	880	940	976	1070	910	832	679	656	739
CFSM	.99	.99	1.07	1.07	1.25	1.28	1.46	1.21	.97	.86	.89	.86
IN.	1.14	1.11	1.24	1.24	1.30	1.48	1.63	1.39	1.08	.99	1.03	.96

CAL YR 1980 TOTAL 374576 MEAN 1023 MAX 2330 MIN 751 CFSM 1.14 IN 15.48
WTR YR 1981 TOTAL 353056 MEAN 947 MAX 1650 MIN 656 CFSM 1.07 IN 14.59

04125500 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°12'11", long 85°47'58", in SW¼ NW¼ sec.20, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 500 ft (152 m) upstream from bridge on State Highway 37, 4.2 mi (6.8 km) northwest of Hoxeyville, 8.0 mi (12.9 km) east of Wellston, and 8.0 mi (12.9 km) upstream from mouth.

DRAINAGE AREA.--251 mi² (650 km²).

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 775 ft (236 m), by barometer.

REMARKS.--Records fair except those for periods of doubtful gage-height record, June 9-July 19, Aug. 28 to Sept. 30, which are poor. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 288 ft³/s (8.156 m³/s), 15.58 in/yr (396 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,440 ft³/s (69.1 m³/s) Aug. 6, 1956, gage height, 6.82 ft (2.079 m), from rating curve extended above 1,100 ft³/s (31.2 m³/s); minimum, 161 ft³/s (4.56 m³/s) Feb. 2, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 650 ft³/s (18.4 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 10	0400	652	18.5	3.05	0.930	Apr. 29	1900	*861	24.4	*3.38	1,030
Apr. 15	1200	658	18.6	3.06	0.933						

Minimum discharge, 214 ft³/s (6.06 m³/s) Dec. 20; minimum gage height, 1.72 ft (0.524 m) Jan. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	260	269	262	258	270	478	357	500	247	267	228	218
2	259	269	267	258	268	419	348	409	247	251	225	220
3	262	271	253	238	249	378	324	371	250	241	227	220
4	279	277	257	231	252	353	335	344	250	239	229	220
5	272	289	258	266	263	332	360	338	255	243	227	220
6	265	284	257	268	263	316	335	352	250	243	225	220
7	262	277	293	260	258	301	312	326	245	239	232	222
8	261	275	376	252	253	297	312	306	250	237	244	230
9	255	274	429	259	249	293	505	294	255	234	249	222
10	254	279	378	244	256	299	606	289	249	237	238	222
11	255	276	311	235	259	301	456	343	243	234	230	222
12	257	269	281	252	241	297	384	389	241	238	224	222
13	258	275	282	263	265	307	348	347	235	242	223	222
14	259	313	269	262	264	307	420	315	247	236	226	222
15	286	339	254	260	259	297	596	300	258	233	242	225
16	306	311	251	259	264	304	448	290	261	235	248	228
17	321	293	236	257	285	301	386	280	254	232	231	228
18	318	281	253	256	341	289	357	277	246	232	223	228
19	312	275	244	259	475	280	329	269	240	232	220	228
20	303	266	224	260	600	275	319	261	234	230	220	228
21	297	264	249	263	591	274	307	254	235	234	220	228
22	291	265	253	264	517	280	293	256	259	232	218	228
23	280	263	252	264	534	288	301	252	309	234	218	230
24	273	267	253	264	597	300	404	264	276	227	220	235
25	285	271	237	266	528	309	408	287	253	227	220	245
26	299	262	251	268	450	311	345	287	244	227	222	250
27	297	256	248	266	398	313	313	274	242	228	220	245
28	287	258	249	266	436	314	407	261	234	231	218	238
29	277	262	261	263	---	331	770	259	249	241	228	238
30	272	262	259	258	---	380	735	254	250	233	225	238
31	271	---	259	242	---	390	---	252	---	228	218	---
TOTAL	8633	8292	8406	7981	9885	9914	12120	9500	7508	7317	7038	6842
MEAN	278	276	271	257	353	320	404	306	250	236	227	228
MAX	321	339	429	268	600	478	770	500	309	267	249	250
MIN	254	256	224	231	241	274	293	252	234	227	218	218
CFSM	1.11	1.10	1.08	1.02	1.41	1.28	1.61	1.22	1.00	.94	.90	.91
IN.	1.28	1.23	1.25	1.18	1.47	1.47	1.80	1.41	1.11	1.08	1.04	1.01

CAL YR 1980 TOTAL 106662 MEAN 291 MAX 600 MIN 218 CFSM 1.16 IN 15.81
WTR YR 1981 TOTAL 103436 MEAN 283 MAX 770 MIN 218 CFSM 1.13 IN 15.33

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW¼ NW¼ sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi (10.3 km) northeast of Manistee, 7.8 mi (12.6 km) upstream from Manistee Lake, and at mile 10.8 (17.4 km).

DRAINAGE AREA.--1,780 mi^2 (4,610 km^2), approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m), from river-profile map.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at all stages by Tippy hydroelectric powerplant 21 mi (34 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 1,996 ft^3/s (56.53 m^3/s), 15.23 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft^3/s (202 m^3/s) Mar. 30, 1976, gage height, 8.37 ft (2.551 m); maximum gage height, 9.15 ft (2.789 m) Feb. 12, 1955, backwater from ice; minimum daily discharge, 570 ft^3/s (16.1 m^3/s) June 18, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,520 ft^3/s (99.7 m^3/s) Feb. 22, gage height, 7.69 ft (2.344 m); maximum gage height, 9.02 ft (2.749 m) Feb. 17, backwater from ice; minimum discharge, 587 ft^3/s (16.6 m^3/s) Aug. 10, gage height, 3.29 ft (1.003 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1830	1690	1490	2190	1410	2930	2870	3140	1450	2160	1370	1810
2	1890	1080	1590	1900	1250	3050	2900	3210	2230	1720	1150	2190
3	1850	1570	1890	2000	1900	2980	2700	2810	2260	1750	1100	1930
4	2100	1550	1960	1500	1650	2790	2730	1910	1180	1700	1920	1550
5	1290	1590	1690	1150	1750	2570	2600	2460	1090	1270	1620	1630
6	1330	1820	1700	1600	1200	2200	2070	2750	1890	1110	1490	1330
7	2090	1710	1600	1900	1250	2130	2340	2440	1460	1330	1710	1220
8	1880	1910	1890	1600	1400	1760	2290	2100	1140	1590	2540	1240
9	1860	1280	2400	1750	2000	2020	2500	1810	1960	1690	1490	2000
10	1840	1330	2580	1850	2200	2100	2780	1700	1460	1380	1430	1470
11	1770	1910	2540	1400	2000	2150	2920	1960	1760	1670	1740	1800
12	1250	1740	2410	1300	1900	2060	2530	2380	1890	1060	1860	1610
13	1280	1730	2150	1700	1750	2100	2300	2080	1570	1210	1670	1330
14	1600	2150	1600	1950	1500	1660	2520	2190	1240	1620	1640	1380
15	2340	2020	1430	1950	1200	1620	2440	2190	1400	1400	1980	1670
16	2000	1540	1710	1950	1500	2010	2470	1850	2040	1560	1340	1530
17	2100	2160	1650	1700	2400	2200	2350	1470	1900	1660	1320	1670
18	2010	1920	1800	1450	2700	1920	2270	1500	2350	1410	1510	1360
19	1890	1850	1750	1600	2600	1980	1810	1910	1290	1000	1790	1580
20	1390	1870	1800	2300	2800	1960	1910	1780	1430	1070	1710	1150
21	1620	1720	1400	1900	3310	1880	2160	1870	1460	2030	1360	1210
22	2120	1720	1200	960	2990	1710	1930	1860	1280	1650	1310	1450
23	2010	1520	1600	1800	3030	1460	2060	1780	2170	1820	1210	1700
24	1770	1620	1750	1800	1800	2100	2150	1680	1870	1640	1300	1360
25	1930	2020	2000	1600	1550	1930	2460	1750	1740	1580	1470	1790
26	1790	1610	1900	2100	1900	2110	2270	1960	1770	1330	1340	1590
27	1670	1850	1800	1950	2350	2440	1870	2080	1630	1110	1790	1420
28	1610	1920	1500	1890	2870	2140	2110	2090	1210	1680	1760	1400
29	2020	1910	1300	1850	---	2130	2650	1730	1160	1700	1750	1900
30	1700	1870	2500	1760	---	2480	2930	1780	1590	1500	1210	1620
31	1730	---	2000	1650	---	2690	---	1570	---	1040	1380	---
TOTAL	55560	52180	56580	54000	56160	67260	71890	63790	48870	46640	48260	46890
MEAN	1792	1739	1825	1742	2006	2170	2396	2058	1629	1505	1557	1563
MAX	2340	2160	2580	2300	3310	3050	2930	3210	2350	2160	2540	2190
MIN	1250	1080	1200	960	1200	1460	1810	1470	1090	1000	1100	1150
CFSM	1.01	.98	1.03	.98	1.13	1.22	1.35	1.16	.92	.85	.88	.88
IN.	1.16	1.09	1.18	1.13	1.17	1.41	1.50	1.33	1.02	.97	1.01	.98

CAL YR 1980 TOTAL 749938 MEAN 2049 MAX 4620 MIN 570 CFSM 1.15 IN 15.67
WTR YR 1981 TOTAL 668080 MEAN 1830 MAX 3310 MIN 960 CFSM 1.03 IN 13.96

04126520 MANISTEE RIVER AT MANISTEE, MI

(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 44°15'02", long 86°19'09", in SW¼ SW¼ sec.1, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on U.S. Highway 31, in Manistee, and 1.3 mi (2.1 km) upstream from mouth.

DRAINAGE AREA.--2,000 mi^2 (5,180 km^2), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981 (discontinued).
WATER TEMPERATURES: November 1974 to September 1981 (discontinued).

INSTRUMENTATION.--Water-quality monitor March 1977 to September 1981 (discontinued).

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Water-discharge measurements are made at times of monthly sampling. Interruptions in the record were due to malfunctions of the instrument.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum daily, 226 micromhos Apr. 22, 1980.
WATER TEMPERATURES: Maximum, 26.5°C July 8, 1981; minimum 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum recorded, 998 micromhos June 22; minimum, 264 micromhos Apr. 22.
WATER TEMPERATURES: Maximum, 26.5°C July 8; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 30...	0930	2460	426	8.0	6.0	11.5	93	380	K28	180	32	52
NOV 24...	1300	2770	476	7.7	4.0	11.9	92	190	110	210	53	62
DEC 18...	1030	--	449	8.1	.0	13.6	94	83	K30	190	43	55
JAN 22...	0900	1870	446	7.7	.5	7.0	49	200	K29	190	35	55
FEB 25...	1030	3580	389	8.0	1.0	11.8	83	330	K46	160	21	46
MAR 18...	1130	2880	425	7.7	1.5	12.5	91	350	72	160	29	46
APR 22...	0900	2420	361	8.1	9.0	10.6	92	K18	K5	170	39	49
MAY 20...	1030	1770	365	7.9	14.0	10.5	102	310	K18	170	31	49
JUN 17...	1100	1820	404	7.9	20.0	8.0	98	260	K50	170	22	49
JUL 29...	1130	2610	404	7.6	19.5	7.7	92	--	92	190	42	53
AUG 26...	1000	2070	411	7.9	21.0	7.6	85	210	K100	190	47	58
SEP 23...	1100	2000	360	7.9	14.5	9.4	88	290	K11	180	32	50

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 30...	12	11	12	.4	1.3	--	180	0	150	2.9	12
NOV 24...	13	13	12	.4	1.6	--	190	0	160	5.8	11
DEC 18...	13	14	14	.4	1.1	--	180	0	150	2.3	13
JAN 22...	13	13	13	.4	1.4	1.0	190	0	150	5.8	13
FEB 25...	10	12	14	.4	1.3	1.0	170	0	140	2.3	13
MAR 18...	11	19	20	.7	1.4	1.0	160	0	130	5.1	13
APR 22...	11	8.2	10	.3	1.2	.90	160	0	130	2.0	10
MAY 20...	12	13	14	.4	1.1	.80	170	0	140	3.7	12
JUN 17...	11	9.0	10	.3	1.3	1.0	180	0	140	3.4	12
JUL 29...	13	12	12	.4	1.1	.80	180	0	150	7.4	13
AUG 26...	12	14	13	.4	1.3	1.0	180	0	150	3.4	14
SEP 23...	14	12	12	.4	.7	--	180	0	150	3.7	12

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
30...	36	.0	7.9	235	220	1560	.19	.19	.040	.040	.05
NOV											
24...	57	.1	7.5	312	260	2330	.27	.27	.070	.040	.08
DEC											
18...	62	.1	8.2	266	237	--	.34	.34	.070	.050	.08
JAN											
22...	6.3	.1	9.7	262	240	1320	.38	.38	.050	.030	--
FEB											
25...	36	.1	8.5	224	199	2170	.34	.32	.050	.050	--
MAR											
18...	46	.1	9.2	270	225	2100	.27	.27	.090	.080	--
APR											
22...	29	.1	7.7	223	195	1460	.23	.22	.050	.030	--
MAY											
20...	30	.1	6.7	239	215	1140	.15	.15	.040	.040	--
JUN											
17...	33	.1	6.2	242	206	1190	.13	.13	.050	.050	--
JUL											
24...	33	.1	7.7	266	223	1880	.09	.09	.030	.030	--
AUG											
26...	62	.1	6.8	252	237	1410	.09	.09	.070	.070	--
SEP											
23...	26	.1	6.5	236	212	1270	.12	.11	.050	.040	--

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
30...	.14	.18	.37	1.6	.020	.06	.020	3.6	3	20	100
NOV											
24...	.06	.11	.38	1.7	.020	.06	.000	9.2	11	82	100
DEC											
18...	.12	.19	.53	2.3	.010	.03	.000	--	--	--	--
JAN											
22...	.09	.14	.52	2.3	.020	.06	<.010	3.9	--	--	--
FEB											
25...	.13	.18	.52	2.3	.010	.03	<.010	3.4	8	77	100
MAR											
14...	.08	.16	.43	1.9	.020	.06	.020	--	--	--	--
APR											
22...	.27	.32	.55	2.4	.010	.03	.010	--	8	52	100
MAY											
20...	.22	.26	.41	1.8	.020	.06	<.010	6.0	--	--	--
JUN											
17...	.53	.58	.71	3.1	.020	.12	<.010	--	12	59	100
JUL											
24...	.20	.23	.32	1.4	.020	.06	<.010	7.9	10	70	100
AUG											
26...	.22	.29	.38	1.7	.040	.12	.010	2.6	8	45	100
SEP											
23...	.25	.30	.42	1.9	.030	.09	<.010	--	15	81	100

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
DEC											
18...	1030	1	1	100	30	0	0	--	50	1	0
MAR											
18...	1130	0	0	100	100	0	0	20	10	0	0
JUN											
17...	1100	1	1	100	20	2	2	10	10	2	6
SEP											
23...	1100	3	3	100	100	2	1	10	<10	4	3

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
DEC										
18...	2	0	210	30	4	1	20	8	.3	.2
MAR										
18...	3	1	430	120	44	3	40	30	<.1	<.1
JUN										
17...	8	4	270	20	11	3	30	4	<.1	<.1
SEP										
23...	110	6	260	30	7	7	30	10	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
DEC										
18...	4	1	0	0	0	0	30	5	3.3	.3
MAR										
18...	18	1	0	0	0	0	50	10	4.4	.4
JUN										
17...	4	2	<1	<1	0	0	10	10	14	.6
SEP										
23...	10	3	<1	<1	<1	<1	20	10	2.6	--

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 24,80	MAR 18,81	MAY 20,81	JUN 17,81
TIME	1300	1130	1030	1100
TOTAL CELLS/ML	670	280	5300	1700
DIVERSITY: DIVISION	1.2	1.7	1.3	0.6
.CLASS	1.2	1.7	1.5	0.6
..ORDER	1.5	2.0	2.0	0.7
...FAMILY	1.7	2.3	2.4	0.8
....GENUS	1.7	2.3	3.0	1.2

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....TETRAEDRON	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	280	5	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	28	1	--	-
....GOLENKINIOPSIS	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	28	1	13	1
....NEPHROCYTIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....QUADRIGULA	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....COELASTRUM	--	-	--	-	--	-	--	-
....GLOEOACTINIUM	--	-	--	-	56	1	--	-
....SCENEDESMUS	--	-	--	-	110	2	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	110	2	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	280#	42	26	9	920#	17	140	8
....MELOSIRA	--	-	--	-	2000#	38	1400#	78
....STEPHANODISCUS	--	-	--	-	--	-	13	1
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	28	1	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	28	1	--	-
....CYMBELLA	--	-	--	-	56	1	--	-
...DIATOMACEAE								
....DIATOMA	--	-	13	5	--	-	--	-
...FRAGILARIACEAE								
....FRAGILARIA	13	2	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	84	2	--	-
...GOMPHONEMATACEAE								
....GOMPHONEIS	--	-	--	-	28	1	--	-
....GOMPHONEMA	--	-	39	14	--	-	--	-
...NAVICULACEAE								
....NAVICULA	13	2	13	5	84	2	--	-
...NITZSCHIACEAE								
....NITZSCHIA	26	4	--	-	220	4	26	1
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	28	1	--	-
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...DINOBRYACEAE								
....DINOBRYON	--	-	--	-	220	4	--	-
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	13	2	13	5	840#	16	90	5
...CRYPTOMONADACEAE								
....CRYPTOMONAS	13	2	--	-	56	1	77	4

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 24,80 1300		MAR 18,81 1130		MAY 20,81 1030		JUN 17,81 1100	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	310#	46	120#	41	56	1	--	-
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	13	1
....TRACHELOMONAS	--	-	64#	23	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	28	1	--	-

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 29,81	AUG 26,81	SEP 23,81
TIME	1130	1000	1100
TOTAL CELLS/ML	2200	12000	4300
DIVERSITY: DIVISION	1.7	1.1	1.5
.CLASS	1.8	1.2	1.5
..ORDER	2.7	2.2	2.2
...FAMILY	3.4	2.5	2.5
....GENUS	3.6	3.1	2.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....TETRAEDRON	14	1	110	1	--	-
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	57	3	--	-	--	-
...HYDRODICTYACEAE						
....PEDIASTRUM	230	10	*	0	110	3
...MICRACTINIACEAE						
....GOLENKINIA	--	-	--	-	--	-
....GOLENKINIOPSIS	--	-	*	0	--	-
....MICRACTINIUM	--	-	--	-	28	1
...OOCYSTACEAE						
....ANKISTRODESMUS	43	2	220	2	--	-
....NEPHROCYTIUM	--	-	83	1	--	-
....OOCYSTIS	--	-	--	-	84	2
....QUADRIGULA	57	3	--	-	--	-
....TREUBARIA	14	1	*	0	--	-
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	96	1	28	1
...SCENEDESMACEAE						
....ACTINASTRUM	--	-	--	-	330	8
....COELASTRUM	--	-	960	8	--	-
....GLOEOACTINIUM	--	-	83	1	--	-
....SCENEDESMUS	--	-	250	2	540	13
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CARTERIA	14	1	--	-	--	-
....CHLAMYDOMONAS	300	14	*	0	--	-
...PHACOTACEAE						
....PHACOTUS	--	-	*	0	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	--	-	*	0	98	2
....MELOSIRA	140	7	300	3	610	14
....STEPHANODISCUS	--	-	--	-	42	1
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
...CYMBELLACEAE						
....AMPHORA	43	2	--	-	--	-
....CYMBELLA	14	1	--	-	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....FRAGILARIA	100	5	700	6	150	4
....SYNEDRA	140	7	--	-	--	-
...GOMPHONEMATACEAE						
....GOMPHONEIS	--	-	--	-	--	-
....GOMPHONEMA	29	1	--	-	--	-
...NAVICULACEAE						
....NAVICULA	160	7	*	0	--	-
...NITZSCHIACEAE						
....NITZSCHIA	29	1	*	0	--	-
...SURIRELLACEAE						
....SURIRELLA	--	-	--	-	--	-
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...DINOBRYACEAE						
....DINOBRYON	--	-	--	-	--	-
...OCHROMONADACEAE						
....OCHROMONAS	72	3	*	0	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	*	0	--	-

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 29,81		AUG 26,81		SEP 23,81	
TIME	1130		1000		1100	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	460#	21	360	3	--	-
....ANACYSTIS	--	-	3900#	33	140	3
..NOSTOCALES						
...NOSTOCACEAE						
....ANABAENA	--	-	1700	14	--	-
....APHANIZOMENON	--	-	2400#	20	1700#	38
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	490	11
....OSCILLATORIA	240	11	450	4	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	--	-	--	-
....TRACHELOMONAS	29	1	*	0	*	0
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GYMNODINIACEAE						
....GYMNODINIUM	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	475	310	345	508	389	413	---	---	---	411	324	357
2	379	320	350	506	390	425	---	---	---	447	346	371
3	411	318	342	426	385	401	---	---	---	540	368	402
4	401	312	331	428	393	407	---	---	---	440	398	409
5	382	318	337	481	395	416	---	---	---	527	403	422
6	421	333	366	516	404	433	---	---	---	536	394	431
7	378	330	349	492	379	410	---	---	---	572	390	423
8	384	326	347	446	351	387	---	---	---	472	403	418
9	---	---	---	556	350	394	---	---	---	450	401	425
10	---	---	---	561	393	422	---	---	---	529	398	424
11	---	---	---	517	405	428	---	---	---	446	395	416
12	---	---	---	469	421	440	---	---	---	461	394	414
13	---	---	---	508	443	463	---	---	---	454	393	408
14	---	---	---	518	446	465	---	---	---	457	398	418
15	---	---	---	504	457	471	---	---	---	443	398	413
16	---	---	---	564	456	482	---	---	---	457	407	426
17	---	---	---	506	461	475	---	---	---	509	431	450
18	---	---	---	499	455	471	---	---	---	517	441	468
19	---	---	---	644	467	500	381	272	319	524	444	466
20	---	---	---	545	448	474	442	281	321	603	453	484
21	---	---	---	565	436	487	420	294	338	585	448	488
22	---	---	---	540	406	445	425	286	335	551	353	430
23	---	---	---	495	391	417	427	306	351	423	355	376
24	---	---	---	434	366	384	380	294	319	428	356	378
25	---	---	---	---	---	---	369	302	323	531	360	395
26	---	---	---	---	---	---	347	311	332	449	347	385
27	---	---	---	---	---	---	390	317	340	422	354	393
28	---	---	---	---	---	---	471	319	361	406	339	372
29	---	---	---	---	---	---	573	320	360	409	350	376
30	---	---	---	---	---	---	409	320	345	400	352	376
31	479	397	420	---	---	---	407	318	347	490	348	387
MONTH										603	324	413

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	604	361	416	485	314	390	372	277	325	500	298	350
2	408	348	370	356	293	321	441	288	341	508	320	359
3	392	343	356	440	313	364	416	265	329	356	284	316
4	399	339	360	445	293	331	706	279	399	428	278	332
5	454	339	376	408	305	340	523	304	369	407	287	332
6	373	337	352	451	294	345	526	279	339	411	298	335
7	421	337	367	500	314	361	384	284	321	485	305	355
8	412	332	358	425	302	336	429	289	341	494	309	352
9	457	341	370	507	299	338	516	308	385	533	291	355
10	442	340	368	409	293	326	661	274	338	417	300	337
11	426	344	377	365	298	321	479	289	370	509	311	353
12	405	347	369	482	291	343	523	293	357	440	287	333
13	423	351	374	474	305	363	459	291	350	549	325	389
14	404	353	375	647	328	398	615	286	402	493	330	391
15	470	352	386	519	311	366	775	293	368	481	319	381
16	409	353	378	511	345	412	478	274	337	450	320	363
17	450	352	385	636	360	438	445	300	332	552	327	378
18	430	349	388	480	372	406	444	278	325	517	317	378
19	464	359	398	526	363	409	464	271	317	499	328	392
20	425	337	385	441	340	378	582	273	330	461	313	375
21	455	349	391	403	322	355	405	272	327	571	303	357
22	593	329	408	519	329	383	553	264	346	377	290	324
23	474	324	375	770	341	432	609	265	317	982	299	387
24	641	302	368	448	327	360	416	291	346	602	312	354
25	412	306	350	458	322	357	621	294	342	465	304	343
26	544	320	374	499	316	368	485	284	337	607	311	365
27	534	282	372	591	331	418	445	293	358	515	321	383
28	418	300	352	426	282	331	765	283	411	477	327	389
29	---	---	---	408	280	327	437	296	371	528	319	367
30	---	---	---	388	285	327	393	283	331	481	341	387
31	---	---	---	452	283	352	---	---	---	537	360	423
MONTH	641	282	375	770	280	364	775	264	349	982	278	362

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	568	339	413	498	341	400	482	371	413	567	382	439
2	601	364	422	449	330	379	458	3 2	394	420	358	390
3	445	344	380	423	334	373	493	356	403	443	346	381
4	520	336	402	447	336	378	491	368	402	462	347	378
5	460	334	384	528	331	386	507	369	401	439	357	391
6	509	348	403	846	363	483	455	356	397	577	346	403
7	446	316	378	609	339	410	456	371	412	613	353	451
8	576	351	407	685	357	429	446	335	387	510	365	414
9	530	352	414	550	354	399	479	346	384	409	357	378
10	700	353	424	480	344	400	766	395	461	432	372	392
11	483	332	395	535	343	405	454	356	405	431	361	392
12	533	333	384	502	362	405	453	365	406	417	351	386
13	611	344	395	551	364	422	496	393	429	440	356	390
14	486	355	406	460	355	394	426	366	393	431	352	381
15	822	374	483	491	357	408	524	377	418	414	354	374
16	863	338	431	458	358	406	476	375	424	413	361	389
17	409	339	369	640	357	400	537	372	422	411	358	394
18	454	333	383	474	366	405	486	381	420	406	349	379
19	491	356	384	448	365	399	567	388	420	432	383	409
20	914	359	432	528	354	411	463	362	407	454	368	399
21	477	357	419	434	361	396	498	368	420	672	375	447
22	998	358	438	463	366	403	560	377	471	548	364	413
23	511	347	394	499	361	405	619	384	463	424	355	391
24	497	350	393	515	362	413	578	406	456	541	376	410
25	479	340	385	538	358	428	480	365	406	509	363	403
26	443	360	396	710	353	424	524	375	422	597	353	402
27	434	353	388	660	409	474	653	411	459	703	370	444
28	464	342	392	505	381	413	549	375	421	466	355	412
29	504	356	403	491	360	400	454	373	409	747	358	415
30	639	355	399	430	367	397	605	386	421	627	357	428
31	---	---	---	476	376	421	522	374	412	---	---	---
MONTH	998	316	403	846	330	408	766	335	418	747	346	402

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	14.5	14.0	14.5	6.5	6.0	6.5	---	---	---	.0	.0	.0
2	14.0	13.0	13.5	6.0	5.5	6.0	---	---	---	.0	.0	.0
3	13.0	12.0	12.5	6.5	5.5	6.0	---	---	---	.0	.0	.0
4	12.5	11.0	11.5	7.0	6.5	7.0	---	---	---	.0	.0	.0
5	11.5	10.5	11.0	7.0	6.5	6.5	---	---	---	.0	.0	.0
6	11.0	10.5	11.0	6.5	6.0	6.5	---	---	---	.0	.0	.0
7	12.0	11.0	11.5	6.5	6.0	6.0	---	---	---	.0	.0	.0
8	12.5	11.5	12.0	6.0	5.5	6.0	---	---	---	.0	.0	.0
9	---	---	---	6.5	5.5	6.0	---	---	---	.0	.0	.0
10	---	---	---	6.0	5.0	5.5	---	---	---	.0	.0	.0
11	---	---	---	5.5	4.5	5.0	---	---	---	.0	.0	.0
12	---	---	---	5.0	4.5	4.5	---	---	---	.0	.0	.0
13	---	---	---	5.0	4.0	4.5	---	---	---	.0	.0	.0
14	---	---	---	5.0	5.0	5.0	---	---	---	.0	.0	.0
15	---	---	---	5.0	5.0	5.0	---	---	---	.0	.0	.0
16	---	---	---	5.0	4.5	5.0	---	---	---	.0	.0	.0
17	---	---	---	5.0	4.0	4.5	---	---	---	.0	.0	.0
18	---	---	---	4.0	4.0	4.0	.0	.0	.0	.0	.0	.0
19	---	---	---	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0
20	---	---	---	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0
21	---	---	---	4.5	4.0	4.0	.5	.0	.0	.0	.0	.0
22	---	---	---	4.0	3.5	4.0	.0	.0	.0	.0	.0	.0
23	---	---	---	4.0	4.0	4.0	.0	.0	.0	.0	.0	.0
24	---	---	---	4.0	4.0	4.0	.0	.0	.0	.0	.0	.0
25	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
26	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
27	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
28	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
29	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
30	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
31	7.0	6.5	6.5	---	---	---	.0	.0	.0	.5	.0	.0
MONTH										.5	.0	.0

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.0	1.5	1.5	1.5	8.5	7.0	8.0	12.0	11.5	11.5
2	.0	.0	.0	1.0	.5	1.0	8.0	7.0	7.5	12.0	11.0	11.5
3	.5	.0	.0	1.5	.5	1.0	8.5	8.0	8.5	13.0	11.5	12.0
4	.0	.0	.0	2.0	1.0	1.5	10.0	9.0	9.5	15.5	13.0	14.0
5	.5	.0	.0	2.0	1.5	1.5	9.5	7.5	8.5	15.0	13.0	14.5
6	.0	.0	.0	2.0	1.5	1.5	7.5	7.0	7.0	13.0	12.5	12.5
7	.0	.0	.0	1.5	1.5	1.5	9.0	7.0	8.0	13.5	12.5	13.0
8	.0	.0	.0	2.5	1.5	2.0	9.5	9.0	9.0	13.5	12.5	13.0
9	.0	.0	.0	2.5	2.0	2.5	9.5	8.5	9.0	14.5	13.0	13.5
10	.0	.0	.0	2.5	2.5	2.5	10.0	9.5	10.0	13.5	12.0	12.5
11	.0	.0	.0	2.5	2.0	2.5	11.5	10.0	10.5	11.5	10.5	11.0
12	.0	.0	.0	3.0	2.0	2.5	11.5	11.0	11.0	12.0	10.5	11.0
13	.0	.0	.0	3.0	2.5	3.0	11.5	10.5	11.0	13.5	11.5	12.5
14	.5	.0	.0	2.5	2.0	2.5	11.5	10.5	11.0	13.5	12.5	13.0
15	.0	.0	.0	3.0	2.5	2.5	10.5	10.0	10.5	13.5	12.5	13.0
16	.5	.0	.0	3.0	2.5	2.5	11.0	10.0	10.5	14.0	13.0	13.5
17	.5	.0	.0	2.5	2.0	2.0	12.0	10.5	11.0	14.0	13.5	13.5
18	.5	.0	.0	2.0	1.5	1.5	12.0	11.0	11.5	14.0	13.5	13.5
19	.5	.0	.0	1.5	1.0	1.5	11.5	10.5	11.0	14.5	13.5	14.0
20	.5	.0	.5	2.0	1.5	1.5	10.5	9.5	10.0	15.5	14.0	14.5
21	1.0	.5	.5	3.0	2.0	2.5	10.5	9.5	10.0	16.5	15.0	15.5
22	1.0	1.0	1.0	4.0	3.0	3.5	11.0	10.0	10.5	17.0	16.0	16.5
23	1.5	1.0	1.0	4.5	3.5	4.0	11.0	10.5	11.0	17.5	16.5	17.0
24	1.5	1.0	1.5	4.5	4.0	4.0	10.5	9.5	10.0	18.5	17.5	18.0
25	1.5	1.0	1.5	5.0	4.0	4.5	11.0	10.0	10.5	19.0	17.5	18.0
26	1.5	1.0	1.5	4.5	4.0	4.5	10.5	10.0	10.0	19.0	18.0	18.5
27	1.5	1.0	1.0	5.5	4.0	4.5	10.5	9.5	10.0	18.5	17.5	18.0
28	1.5	1.0	1.5	6.0	5.0	5.5	11.5	10.5	11.0	18.5	17.0	18.0
29	---	---	---	7.5	6.0	6.5	11.5	10.5	11.0	19.5	18.0	18.5
30	---	---	---	7.5	7.0	7.5	12.0	11.0	11.5	19.5	17.0	19.0
31	---	---	---	8.5	6.5	7.5	---	---	---	18.5	17.5	18.0
MONTH	1.5	.0	.5	8.5	.5	3.0	12.0	7.0	10.0	19.5	10.5	14.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.5	18.0	18.5	23.0	21.5	22.0	22.5	22.0	22.5	22.0	21.5	22.0
2	19.5	19.0	19.0	23.5	22.0	22.5	23.0	22.5	22.5	21.5	20.5	21.0
3	20.0	19.0	19.5	23.5	22.5	23.0	23.0	22.0	22.5	21.0	20.0	20.5
4	20.5	19.0	19.5	23.5	22.0	23.0	24.0	22.0	23.0	20.5	20.0	20.5
5	20.5	19.0	19.5	24.5	21.5	23.5	23.0	22.0	22.5	20.5	20.0	20.0
6	20.5	20.0	20.5	24.0	21.5	23.0	23.0	22.5	22.5	20.5	19.5	20.0
7	20.5	20.0	20.5	25.5	23.0	24.0	23.0	22.5	22.5	20.5	19.5	20.0
8	20.5	20.0	20.0	26.5	24.5	25.0	22.5	21.5	22.0	20.0	19.5	20.0
9	20.0	19.5	19.5	26.0	23.5	25.5	23.0	21.0	21.5	20.0	19.0	19.5
10	20.0	19.0	19.5	25.5	23.5	24.5	23.0	22.5	22.5	20.5	19.0	19.5
11	20.5	20.0	20.5	25.0	24.5	24.5	23.0	22.0	22.5	21.0	20.0	20.5
12	22.0	20.5	21.0	25.0	23.5	24.0	23.0	22.0	22.5	21.0	20.5	21.0
13	21.5	20.5	21.0	25.5	23.5	24.5	23.0	22.5	23.0	21.0	20.5	20.5
14	22.5	21.5	21.5	25.0	23.5	24.0	23.0	22.5	22.5	21.0	20.0	20.5
15	23.5	22.5	23.0	24.0	22.5	23.5	22.5	21.5	22.5	20.0	19.5	20.0
16	23.0	22.0	22.5	23.0	22.0	23.0	21.5	21.0	21.0	19.5	18.5	19.0
17	22.0	20.5	21.5	23.5	22.0	23.0	22.0	20.5	21.0	18.5	17.5	18.0
18	21.5	21.0	21.0	23.5	23.0	23.0	22.0	20.5	21.0	17.5	16.5	17.0
19	21.0	20.5	21.0	24.0	23.0	23.5	22.0	20.0	21.0	18.0	17.0	17.5
20	21.0	20.5	20.5	24.0	23.0	23.5	22.0	20.5	21.5	17.5	17.0	17.0
21	20.5	19.5	20.0	23.5	21.5	22.5	22.0	21.0	21.0	17.0	16.0	16.5
22	20.0	20.0	20.0	22.0	21.0	21.5	22.5	21.0	22.0	16.5	15.5	16.0
23	20.5	19.5	20.0	22.5	21.0	21.5	22.5	21.5	22.0	16.0	15.0	15.5
24	21.0	20.0	20.5	22.5	22.0	22.5	23.5	22.0	22.5	16.0	15.5	15.5
25	21.5	21.0	21.0	23.5	22.5	23.0	23.5	22.0	22.5	16.0	15.5	16.0
26	21.0	20.0	20.5	23.5	22.0	23.0	23.0	22.5	22.5	16.0	15.5	15.5
27	21.5	20.0	20.5	22.0	21.0	22.0	23.0	22.0	22.5	16.0	15.0	15.5
28	21.0	20.5	21.0	21.5	20.5	21.0	22.0	21.5	21.5	15.5	14.0	14.5
29	21.0	20.5	21.0	21.5	20.0	20.5	22.0	21.5	21.5	14.5	14.0	14.5
30	22.0	21.0	21.5	21.5	21.0	21.5	22.5	21.5	22.0	14.5	14.0	14.0
31	---	---	---	22.0	20.5	21.5	22.5	21.5	22.0	---	---	---
MONTH	23.5	18.0	20.5	26.5	20.0	23.0	24.0	20.0	22.0	22.0	14.0	18.5

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI

LOCATION.--Lat 44°38'18", long 85°31'10", in SE¼ NE¼ sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft (8 m) downstream from Brown's Bridge, 300 ft (91 m) downstream from East Creek, 0.9 mi (1.4 km) downstream from Brown's Bridge Dam, 1.0 mi (1.6 km) northeast of Mayfield, and 9.6 mi (15.4 km) southeast of Traverse City.

DRAINAGE AREA.--186 mi² (482 km²).

PERIOD OF RECORD.--June 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft (230 m), by barometer.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 0.9 mi (1.4 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 192 ft³/s (5.437 m³/s), 14.02 in/yr (356 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Sept. 14, 1961, gage height, 6.90 ft (2.103 m); minimum, 30 ft³/s (0.85 m³/s) Jan. 15, 1965, gage height, 2.53 ft (0.771 m); minimum daily, 47 ft³/s (1.33 m³/s) Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 358 ft³/s (10.1 m³/s) Apr. 4, gage height, 4.41 ft (1.344 m); minimum, 52 ft³/s (1.47 m³/s) Jan. 25, gage height, 2.74 ft (0.835 m); minimum daily, 107 ft³/s (3.03 m³/s) Sept. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	118	154	157	138	140	281	279	258	152	145	143	139
2	122	154	176	136	139	240	289	267	153	140	142	136
3	140	154	174	138	138	222	278	263	151	139	127	140
4	142	154	138	130	139	217	284	171	156	139	149	136
5	140	154	117	128	138	197	246	134	152	138	160	130
6	172	152	137	132	141	189	232	182	150	144	152	130
7	160	152	162	136	142	187	248	196	149	149	160	129
8	138	152	192	140	142	186	247	182	138	149	164	145
9	144	148	194	140	143	172	285	175	142	148	161	145
10	150	148	181	138	139	170	262	175	146	143	181	134
11	152	148	152	138	137	174	242	194	151	131	161	132
12	156	148	138	140	130	179	238	187	155	118	152	130
13	176	152	138	140	136	184	230	177	152	118	145	128
14	192	166	135	140	142	178	230	157	147	117	135	133
15	178	162	156	140	142	181	212	149	159	118	140	136
16	158	158	157	138	145	173	202	150	204	118	135	126
17	136	140	123	138	147	158	203	151	175	119	134	121
18	138	134	131	140	165	169	201	165	155	123	131	116
19	224	134	128	138	277	161	200	162	152	121	141	116
20	196	138	127	138	210	159	186	172	152	125	157	116
21	146	150	131	140	157	166	176	171	154	136	152	119
22	120	156	130	138	165	167	175	143	164	139	145	120
23	134	154	132	140	242	179	190	141	172	134	145	114
24	158	154	124	144	262	194	201	194	168	129	134	107
25	162	138	122	141	230	186	195	216	150	128	123	109
26	158	128	130	148	217	180	191	195	149	129	119	112
27	166	128	138	145	205	180	186	174	147	124	119	110
28	162	124	132	137	258	197	283	162	146	120	134	109
29	152	124	130	142	---	252	312	149	142	122	143	108
30	150	123	136	141	---	321	282	146	147	128	143	109
31	152	---	138	136	---	288	---	148	---	139	144	---
TOTAL	4792	4381	4456	4298	4768	6087	6985	5506	4630	4070	4471	3735
MEAN	155	146	144	139	170	196	233	178	154	131	144	125
MAX	224	166	194	148	277	321	312	267	204	149	181	145
MIN	118	123	117	128	130	158	175	134	138	117	119	107
CFSM	.83	.79	.77	.75	.91	1.05	1.25	.96	.83	.70	.77	.67
IN.	.96	.88	.89	.86	.95	1.22	1.40	1.10	.93	.81	.89	.75

CAL YR 1980 TOTAL 64584 MEAN 176 MAX 429 MIN 117 CFSM .95 IN 12.92
WTR YR 1981 TOTAL 58179 MEAN 159 MAX 321 MIN 107 CFSM .86 IN 11.64

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW¼ NW¼ sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft (183 m) downstream from Webster Bridge, 4.2 mi (6.8 km) south of East Jordan and 4.5 mi (7.2 km) upstream from mouth.

DRAINAGE AREA.--67.6 mi^2 (175 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m), from topographic map. Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft (183 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation during the low flows by fish hatchery above station.

AVERAGE DISCHARGE.--15 years, 188 ft^3/s (5.324 m^3/s), 37.77 in/yr (959 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft^3/s (38.5 m^3/s) July 19, 1975, gage height, 6.51 ft (1.984 m); minimum, 109 ft^3/s (3.09 m^3/s) Mar. 1, 8, 1967, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 710 ft^3/s (20.1 m^3/s) Apr. 4, gage height, 5.38 ft (1.640 m), only peak above base of 400 ft^3/s (11.3 m^3/s); minimum, 122 ft^3/s (3.455 m^3/s) Dec. 17, gage height, 2.85 ft (0.869 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	175	170	175	170	170	216	242	180	162	155	145	148
2	183	170	178	164	165	189	216	176	162	154	145	154
3	178	170	170	160	166	181	201	175	168	155	148	147
4	174	172	170	160	162	180	522	172	167	154	159	145
5	174	172	170	170	165	176	262	199	163	153	157	148
6	175	172	174	168	168	175	208	187	159	152	149	146
7	174	174	200	165	168	174	196	175	158	149	157	147
8	171	172	225	162	168	175	222	174	161	149	158	188
9	168	176	200	165	168	176	315	172	159	149	153	153
10	170	174	181	160	170	180	213	175	162	146	150	146
11	200	170	178	160	172	178	197	176	161	146	148	143
12	214	167	178	170	153	179	187	172	189	152	149	144
13	183	174	175	170	165	185	183	170	171	153	149	142
14	175	187	171	170	170	172	226	170	167	148	151	142
15	171	176	175	168	171	184	197	170	188	148	186	144
16	170	170	171	168	188	180	187	168	250	149	156	145
17	179	170	158	167	206	175	200	167	174	154	148	144
18	176	171	158	167	251	171	187	166	163	164	146	145
19	196	170	158	167	231	171	184	166	159	152	144	146
20	197	168	158	168	236	172	183	164	159	152	142	145
21	185	176	158	167	212	172	178	163	166	154	142	146
22	179	174	158	167	213	176	179	162	189	150	142	148
23	172	174	160	168	263	187	197	163	172	148	142	146
24	170	187	160	167	230	190	194	237	163	148	141	148
25	178	174	160	168	199	197	183	216	161	150	140	156
26	199	170	160	179	187	213	179	179	159	149	141	166
27	189	170	160	172	190	222	180	174	155	146	157	164
28	178	175	162	168	321	231	208	171	155	154	147	158
29	174	178	165	167	---	275	226	167	159	159	158	160
30	172	176	168	165	---	302	188	164	161	149	161	159
31	171	---	170	165	---	251	---	163	---	146	147	---
TOTAL	5570	5199	5304	5172	5428	6005	6440	5433	5042	4686	4658	4513
MEAN	180	173	171	167	194	194	215	175	168	151	150	150
MAX	214	187	225	179	321	302	522	237	250	164	186	188
MIN	168	167	158	160	153	171	178	162	155	146	140	142
CFSM	2.66	2.56	2.53	2.47	2.87	2.87	3.18	2.59	2.49	2.23	2.22	2.22
IN.	3.07	2.86	2.92	2.85	2.99	3.30	3.54	2.99	2.77	2.58	2.56	2.48

CAL YR 1980 TOTAL 68767 MEAN 188 MAX 372 MIN 158 CFSM 2.78 IN 37.84
WTR YR 1981 TOTAL 63450 MEAN 174 MAX 522 MIN 140 CFSM 2.57 IN 34.92

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORDS.--
WATER TEMPERATURES: October 1966 to current year.

INSTRUMENTATION.--Temperature recorder since October 1966.

REMARKS.--Temperature recorder clock stopped Jan. 28 to Feb. 10 (range in temperature 0.5 to 1.0ºC).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 20.0ºC July 11, 1976; minimum, 0.0ºC on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 18.0ºC June 14, 15, July 8-10, 13; minimum, 0.0ºC on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.5	9.0	5.5	5.5	3.0	3.0	.5	.5	---	---	2.5	2.5
2	9.5	9.5	5.5	5.5	3.0	1.0	.5	.0	---	---	2.5	2.0
3	9.5	8.0	6.0	5.5	1.0	1.0	.0	.0	---	---	2.0	2.0
4	8.0	6.5	6.5	6.0	1.0	1.0	.0	.0	---	---	2.0	2.0
5	6.5	6.5	6.0	5.5	1.5	1.0	.0	.0	---	---	2.0	2.0
6	6.5	6.5	5.5	5.5	2.0	1.0	.0	.0	---	---	2.0	2.0
7	6.5	6.5	5.5	5.5	2.5	2.0	.0	.0	---	---	2.5	2.0
8	8.0	6.5	5.5	4.5	2.5	2.5	.0	.0	---	---	3.0	2.5
9	8.0	6.5	5.0	4.5	2.5	2.5	.0	.0	---	---	3.5	3.0
10	7.0	6.5	5.0	4.5	2.5	.5	.0	.0	---	---	3.5	3.5
11	7.0	7.0	4.5	4.0	.5	.5	.0	.0	1.0	1.0	3.5	3.5
12	7.0	7.0	4.0	3.0	.5	.5	.0	.0	1.0	1.0	3.5	3.0
13	7.0	7.0	4.0	3.0	.5	.5	.0	.0	1.0	1.0	3.5	3.0
14	7.0	6.5	4.0	4.0	.5	.5	.0	.0	1.0	1.0	3.0	2.0
15	6.5	6.5	4.0	4.0	.5	.5	.0	.0	2.5	1.0	3.0	2.0
16	7.0	6.5	4.0	3.5	.5	.5	.0	.0	3.0	2.5	3.0	2.0
17	9.0	7.0	3.5	3.5	.5	.0	.0	.0	3.5	3.0	2.0	2.0
18	9.0	8.0	3.5	3.5	.0	.0	.0	.0	3.5	3.5	2.0	2.0
19	9.0	7.5	3.5	3.5	.0	.0	.0	.0	3.5	3.5	2.0	2.0
20	7.5	7.0	3.5	3.5	.0	.0	.5	.0	3.5	3.5	2.0	2.0
21	7.0	7.0	4.0	3.5	.0	.0	.5	.5	3.5	3.5	3.5	2.0
22	7.0	6.5	4.0	4.0	.0	.0	1.0	.5	3.5	3.5	4.0	3.0
23	6.5	6.5	4.5	4.0	.0	.0	1.5	1.0	3.5	3.5	4.0	4.0
24	7.0	6.5	4.5	4.0	.0	.0	1.5	1.5	3.5	3.5	4.5	4.0
25	7.0	7.0	4.0	3.5	.0	.0	1.5	1.5	3.5	3.5	5.0	4.5
26	7.0	6.0	3.5	3.0	.0	.0	2.0	1.5	3.5	3.0	5.0	4.5
27	6.0	6.0	3.0	3.0	.0	.0	2.0	1.5	3.0	2.5	5.5	4.5
28	6.0	5.5	3.0	3.0	.0	.0	---	---	2.5	2.5	5.5	5.0
29	5.5	5.5	3.0	3.0	1.0	.5	---	---	---	---	5.5	5.5
30	5.5	5.5	3.0	3.0	1.0	1.0	---	---	---	---	5.5	5.5
31	5.5	5.5	---	---	1.0	.5	---	---	---	---	6.5	5.5
MONTH	9.5	5.5	6.5	3.0	3.0	.0	2.0	.0			6.5	2.0

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.5	6.5	9.5	8.5	13.0	11.5	15.0	13.0	17.0	15.5	15.5	15.5
2	6.5	5.5	9.0	7.0	14.0	12.0	16.0	15.0	17.0	16.0	15.5	14.0
3	8.0	6.5	10.5	8.5	15.0	14.0	16.0	14.5	16.0	15.5	14.0	13.0
4	9.5	8.0	14.0	10.5	15.0	14.0	16.0	14.5	16.0	15.5	14.0	13.0
5	9.0	5.0	14.0	11.0	15.0	14.0	16.5	14.5	16.5	15.0	13.5	13.0
6	5.5	4.0	11.0	9.0	16.0	14.5	16.5	14.5	16.5	15.0	13.5	13.5
7	7.5	5.5	10.5	8.5	16.0	13.5	17.5	15.5	16.0	15.5	13.5	13.0
8	7.5	7.5	10.0	9.0	15.0	14.5	18.0	16.0	16.0	15.5	13.5	13.5
9	7.5	6.5	11.5	9.0	15.0	13.5	18.0	17.0	16.5	15.0	13.5	11.5
10	8.0	7.5	11.5	8.0	15.0	14.0	18.0	14.5	16.5	15.5	14.5	12.5
11	10.0	8.0	8.0	7.5	15.5	13.0	17.0	14.5	16.5	15.0	14.5	13.5
12	10.0	9.0	9.5	7.5	15.0	14.0	16.0	14.5	16.5	15.0	14.5	14.5
13	9.0	7.5	10.5	9.0	14.5	14.0	18.0	16.0	16.0	15.5	14.5	13.0
14	9.0	6.5	10.5	9.0	18.0	14.5	17.5	15.0	16.0	16.0	14.0	13.5
15	6.5	4.5	10.5	10.0	18.0	17.0	16.0	14.0	16.0	15.5	14.0	12.5
16	8.0	6.0	12.0	9.5	17.5	15.5	15.5	14.5	16.0	14.5	12.0	10.5
17	9.0	7.5	12.0	10.0	15.5	13.5	15.5	14.5	15.5	13.5	10.5	10.5
18	9.0	8.0	11.0	9.0	14.5	14.0	17.0	14.5	15.0	13.5	10.5	9.5
19	8.5	6.5	11.5	9.0	15.0	13.5	17.0	16.0	15.5	13.5	10.5	9.5
20	6.5	5.5	12.5	10.0	15.0	13.5	16.5	15.5	15.5	13.5	10.5	9.5
21	6.0	5.0	13.5	11.5	13.5	13.5	15.5	14.5	15.5	14.0	10.0	9.5
22	7.0	6.0	14.0	12.0	13.5	13.5	14.5	12.5	15.0	14.5	9.5	8.5
23	7.0	7.0	14.0	13.5	14.5	12.5	15.0	13.0	16.0	14.5	8.5	8.0
24	7.5	7.0	13.5	13.0	14.5	13.5	15.5	14.0	16.5	15.5	9.0	8.0
25	7.5	7.0	14.5	13.0	14.5	13.5	16.0	15.0	16.5	14.5	9.5	9.0
26	7.0	6.0	14.5	13.5	14.0	11.5	16.0	15.0	16.0	15.0	10.5	9.5
27	8.0	6.5	13.5	12.0	14.5	12.0	16.0	13.5	15.0	14.5	10.0	10.0
28	8.0	7.5	13.5	12.0	14.0	13.0	14.5	13.5	15.0	15.0	10.0	9.0
29	8.5	7.5	14.5	13.0	15.0	13.5	15.0	12.5	15.0	14.5	9.0	8.5
30	8.5	7.5	14.5	14.0	15.0	14.0	15.5	13.5	15.5	14.5	8.5	8.5
31	---	---	14.0	11.0	---	---	16.5	14.5	15.5	15.0	---	---
MONTH	10.0	4.0	14.5	7.0	18.0	11.5	18.0	12.5	17.0	13.5	15.5	8.0

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW¼ NE¼ sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft (5 m) upstream from county highway bridge, 3.2 mi (5.1 km) south of Rudyard.

DRAINAGE AREA.--184 mi^2 (477 km^2).

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 238 ft^3/s (6.740 m^3/s), 17.57 in/yr (446 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft^3/s (119 m^3/s) June 18, 1975, gage height, 17.62 ft (5.371 m); minimum, 56 ft^3/s (1.59 m^3/s) July 28, 1977, gage height, 1.86 ft (0.567 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft^3/s (1.42 m^3/s) was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s (34.0 m^3/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft^3/s)	(m^3/s)	(ft)	(m)			(ft^3/s)	(m^3/s)	(ft)	(m)
Mar. 30	--	1500	42.5	ice jam		Apr. 4	1400	*2600	73.6	*12.35	3.764

Minimum discharge, 57 ft^3/s (1.61 m^3/s) part or all of each day Aug. 23-29, gage height, 1.87 ft (0.570 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	120	140	82	72	310	1330	198	86	204	62	68
2	151	117	131	82	72	280	1230	186	85	163	61	71
3	135	114	125	82	70	265	1100	171	93	134	62	71
4	123	113	120	82	69	250	2190	210	121	115	79	66
5	115	111	115	80	69	240	1830	278	108	103	134	63
6	111	109	111	78	69	220	1120	264	101	94	108	62
7	111	113	108	78	69	210	763	217	98	88	92	61
8	113	109	100	78	69	200	1040	191	124	84	89	71
9	100	131	95	78	69	190	983	174	157	80	85	95
10	96	154	85	78	69	180	670	162	132	74	80	79
11	104	134	83	78	69	170	529	149	118	73	76	80
12	103	184	82	78	70	165	419	141	109	70	81	75
13	101	238	82	78	70	160	337	134	106	68	85	76
14	101	354	82	78	72	150	640	128	110	68	83	73
15	101	305	82	78	74	145	502	122	139	66	78	69
16	100	231	80	78	74	140	379	116	207	65	74	64
17	102	218	81	78	76	140	325	112	183	66	69	64
18	120	189	79	78	86	135	298	108	146	84	66	69
19	119	216	79	78	130	130	264	104	149	82	64	66
20	115	172	80	78	180	130	234	101	126	75	61	64
21	111	214	80	78	240	130	215	96	116	72	60	62
22	111	198	80	78	300	135	201	94	115	69	61	61
23	110	205	80	78	400	150	235	92	114	67	58	60
24	123	258	80	78	600	180	362	91	106	66	57	60
25	190	195	80	78	540	250	319	101	103	65	57	61
26	175	170	79	78	450	380	266	103	98	68	57	67
27	161	160	78	76	380	550	235	97	91	68	57	71
28	147	149	80	76	340	800	229	95	85	65	57	69
29	136	147	80	74	---	1200	242	90	184	65	59	72
30	128	144	80	72	---	1400	221	91	252	65	66	69
31	122	---	80	72	---	1390	---	90	---	64	68	---
TOTAL	3785	5272	2817	2416	4848	10375	18708	4306	3762	2590	2246	2049
MEAN	122	176	90.9	77.9	173	335	624	139	125	83.5	72.5	68.3
MAX	190	354	140	82	600	1400	2190	278	252	204	134	85
MIN	96	109	78	72	69	130	201	90	85	64	57	60
CFSM	.66	.96	.49	.42	.94	1.82	3.39	.76	.68	.45	.39	.37
IN.	.77	1.07	.57	.49	.98	2.10	3.78	.87	.76	.52	.45	.41

CAL YR 1980 TOTAL 74977 MEAN 205 MAX 3620 MIN 69 CFSM 1.11 IN 15.16
WTR YR 1981 TOTAL 63174 MEAN 173 MAX 2190 MIN 57 CFSM .94 IN 12.77

04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE¼ NE¼ sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi (2.9 km) north of Wolverine, 2.8 mi (4.5 km) downstream from West Branch, and 9 mi (14 km) upstream from mouth.

DRAINAGE AREA.--170 mi² (440 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M). WSP 1727: 1951(M).

GAGE.--Water-stage recorder. Altitude of gage is 740 ft (226 m), from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi (1.6 km) upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi (1.1 km) upstream at different datums.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Prior to July 1975 intermittent regulation at low flows by ponds 2.4 mi (3.9 km) above station.

AVERAGE DISCHARGE.--39 years, 218 ft³/s (6.174 m³/s), 17.41 in/yr (442 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Sept. 29, 1972, gage height, 3.72 ft (1.134 m); maximum gage height, 4.48 ft (1.366 m) Sept. 14, 1961; minimum discharge, 94 ft³/s (2.66 m³/s) Jan. 19, 1971, result of freezeup; minimum daily, 113 ft³/s (3.20 m³/s) Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 485 ft³/s (13.7 m³/s) Apr. 4, gage height, 2.58 ft (0.786 m); maximum gage height, 2.85 ft (0.869 m) Jan. 13, backwater from ice; minimum discharge,114 ft³/s (3.23 m³/s) Dec. 17, gage height, 1.31 ft (0.399 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	187	195	198	197	180	309	324	216	176	135	135	181
2	198	192	202	202	165	247	304	203	173	132	134	202
3	211	193	198	173	160	219	275	203	186	132	139	169
4	198	194	190	198	165	214	436	198	227	131	167	158
5	192	196	198	198	165	206	393	200	189	131	170	158
6	191	194	199	198	170	204	281	205	176	127	153	154
7	193	197	211	198	190	206	251	195	169	122	165	153
8	190	197	262	198	182	205	246	187	167	121	281	212
9	185	204	255	200	174	211	395	185	167	122	204	181
10	186	207	220	200	165	217	304	185	165	120	184	201
11	196	200	210	200	155	209	255	191	165	121	169	180
12	217	195	208	202	150	199	232	190	167	123	155	174
13	206	203	205	205	162	203	221	186	173	124	152	159
14	200	228	202	202	180	190	260	183	169	122	154	152
15	195	219	200	202	205	205	247	180	178	122	192	148
16	194	206	180	200	216	206	219	180	272	122	169	147
17	201	200	152	200	252	196	229	176	189	125	153	149
18	213	202	190	200	297	189	223	176	162	127	146	148
19	217	199	190	200	352	184	205	174	156	126	142	149
20	227	200	192	198	311	185	201	173	149	133	141	148
21	226	204	190	190	275	186	195	170	160	133	136	148
22	218	209	190	194	265	192	194	168	181	131	137	149
23	206	203	188	196	287	203	231	168	178	128	142	148
24	201	208	185	194	289	216	259	201	156	129	149	147
25	205	199	180	191	258	224	228	255	152	137	147	154
26	215	192	185	199	237	239	211	218	147	143	145	176
27	218	190	188	194	233	250	207	214	142	135	178	181
28	207	198	190	192	386	262	218	197	136	136	169	172
29	201	201	192	192	---	315	295	188	138	153	181	164
30	199	200	197	190	---	357	241	184	136	142	206	162
31	197	---	196	180	---	351	---	179	---	138	183	---
TOTAL	6290	6025	6143	6083	6226	7001	7780	5928	5101	4023	5078	4924
MEAN	203	201	198	196	222	226	259	191	170	130	164	164
MAX	227	228	262	205	386	357	436	255	272	153	281	212
MIN	185	190	152	173	150	184	194	168	136	120	134	147
CFSM	1.19	1.18	1.17	1.15	1.31	1.33	1.52	1.12	1.00	.77	.97	.97
IN.	1.38	1.32	1.34	1.33	1.36	1.53	1.70	1.30	1.12	.88	1.11	1.08

CAL YR 1980 TOTAL 80946 MEAN 221 MAX 687 MIN 152 CFSM 1.30 IN 17.71
WTR YR 1981 TOTAL 70602 MEAN 193 MAX 436 MIN 120 CFSM 1.14 IN 15.45

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1958 to current year.

INSTRUMENTATION.--Temperature recorder since October 1958.

REMARKS.--Temperature recorder clock stopped Oct. 24 to Nov. 7 (range in temperature 5.0 to 6.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C June 30, 1964; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 21.0°C July 9; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBFR		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	11.0	---	---	.5	.5	.0	.0	.0	.0	2.0	2.0
2	12.0	11.5	---	---	.0	.0	.0	.0	.0	.0	2.5	2.0
3	11.5	10.5	---	---	.0	.0	.0	.0	.0	.0	2.0	2.0
4	10.0	9.0	---	---	.0	.0	.0	.0	.0	.0	2.0	2.0
5	8.5	8.0	---	---	.0	.0	.0	.0	.0	.0	2.5	2.0
6	8.5	8.0	---	---	.0	.0	.0	.0	.0	.0	2.5	2.0
7	8.5	8.0	---	---	.5	.0	.0	.0	.0	.0	2.5	2.0
8	10.0	8.5	5.0	5.0	.5	.5	.0	.0	.0	.0	3.5	2.5
9	10.0	8.5	4.5	4.5	.5	.5	.0	.0	.0	.0	3.5	3.5
10	8.5	8.5	4.5	4.5	.5	.0	.0	.0	.0	.0	3.5	3.5
11	8.5	8.5	4.5	4.0	.0	.0	.0	.0	.0	.0	3.5	3.0
12	8.5	8.5	4.0	4.0	.0	.0	.0	.0	.0	.0	3.5	3.0
13	8.5	8.5	4.0	4.0	.0	.0	.0	.0	.0	.0	3.5	3.0
14	8.5	8.5	3.5	3.5	.0	.0	.0	.0	.0	.0	3.0	2.0
15	8.5	8.0	3.5	3.5	.0	.0	.0	.0	.0	.0	3.0	2.5
16	8.0	8.0	3.5	2.0	.0	.0	.0	.0	.5	.0	3.0	2.0
17	10.0	8.0	2.0	2.0	.0	.0	.0	.0	.5	.5	2.0	2.0
18	9.5	8.5	1.5	1.5	.0	.0	.0	.0	.5	2.5	2.0	2.0
19	8.5	8.0	1.5	1.5	.0	.0	.0	.0	2.5	2.5	2.0	2.0
20	8.0	7.5	1.5	1.5	.0	.0	.0	.0	2.5	2.5	2.0	2.0
21	7.5	7.5	1.5	1.5	.0	.0	.0	.0	3.0	2.5	4.0	2.0
22	7.5	7.0	1.5	1.0	.0	.0	.0	.0	3.0	2.5	4.0	3.0
23	7.0	6.5	1.5	1.5	.0	.0	.0	.0	2.5	2.5	4.5	3.5
24	---	---	1.5	1.5	.0	.0	.0	.0	2.5	2.5	5.0	4.0
25	---	---	1.5	1.0	.0	.0	.0	.0	2.5	2.5	5.5	4.0
26	---	---	1.0	1.0	.0	.0	.0	.0	2.5	2.0	5.5	4.0
27	---	---	.5	.5	.0	.0	.0	.0	2.0	1.5	6.5	4.0
28	---	---	.5	.5	.0	.0	.0	.0	2.0	2.0	6.5	4.5
29	---	---	.5	.5	.0	.0	.0	.0	---	---	6.5	6.0
30	---	---	.5	.5	.0	.0	.0	.0	---	---	6.5	6.0
31	---	---	---	---	.0	.0	.0	.0	---	---	7.0	6.0
MONTH					.5	.0	.0	.0	3.0	.0	7.0	2.0

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.0	6.0	9.5	8.0	15.0	13.0	18.0	13.5	19.5	16.0	17.0	15.5
2	7.5	5.0	9.5	7.0	17.0	13.0	18.5	15.5	18.5	16.5	16.0	14.5
3	8.5	7.0	10.0	8.5	16.5	15.5	17.5	15.5	18.0	16.5	15.0	13.0
4	9.5	8.5	14.5	10.0	17.0	14.5	17.5	15.5	18.0	16.5	15.0	13.0
5	9.5	5.5	13.5	11.0	18.0	14.5	18.5	15.0	18.0	15.5	14.5	13.0
6	6.5	4.5	11.5	9.0	18.5	15.0	19.0	15.0	17.0	16.0	14.5	14.0
7	8.5	5.0	11.5	8.5	16.5	13.5	19.5	16.0	17.0	16.0	14.5	13.0
8	8.5	8.0	11.0	9.0	16.5	15.0	20.5	17.0	17.0	16.0	14.5	13.5
9	7.5	6.0	13.0	9.5	17.0	14.0	21.0	18.5	18.0	15.0	14.0	12.0
10	8.0	7.0	11.5	8.5	16.0	14.0	19.5	16.0	17.5	16.0	15.0	13.0
11	10.5	8.0	8.5	7.5	17.5	13.5	18.0	16.0	17.0	15.5	15.5	13.0
12	10.0	8.0	9.5	7.5	17.0	15.0	19.0	16.5	17.0	14.5	15.5	14.0
13	9.5	6.5	10.5	9.0	16.0	14.5	20.5	17.0	16.5	15.0	15.5	13.0
14	9.5	6.5	10.5	8.5	18.5	15.5	18.5	16.0	16.5	15.5	15.5	13.5
15	7.0	5.5	11.0	9.5	19.5	17.0	17.5	15.5	16.5	15.5	14.5	12.5
16	8.5	5.5	13.5	9.5	18.0	16.0	16.5	15.0	16.5	14.0	13.0	11.5
17	9.5	8.5	12.5	10.0	17.5	14.5	17.0	15.0	16.0	13.0	11.5	11.0
18	9.5	7.5	12.5	9.5	16.5	15.0	18.5	15.0	15.5	13.0	11.0	10.5
19	9.0	6.5	13.0	9.5	17.0	14.5	18.0	16.0	15.5	13.0	12.0	10.5
20	7.0	5.0	14.0	10.0	14.5	13.5	17.5	16.5	15.5	13.0	12.0	10.5
21	7.0	5.0	15.5	11.5	14.5	13.5	16.5	15.5	16.0	13.0	10.5	10.5
22	7.5	6.0	16.0	12.5	14.0	13.5	16.0	13.5	16.0	13.5	10.5	9.5
23	7.5	7.0	15.5	14.0	16.0	12.5	15.5	13.5	16.5	14.0	9.5	9.0
24	8.0	6.0	14.5	14.0	15.5	14.0	16.5	14.0	17.5	15.5	9.0	9.0
25	7.5	6.5	16.0	13.5	15.0	13.5	16.5	15.0	17.5	13.5	9.5	9.0
26	7.5	6.0	15.0	13.5	15.5	12.5	18.0	15.5	16.5	14.0	11.0	10.0
27	8.0	6.0	14.5	13.5	16.0	12.5	16.5	14.0	15.0	14.5	11.5	11.0
28	8.0	7.5	16.5	13.0	15.5	13.5	15.5	13.5	15.0	14.5	11.0	9.5
29	8.5	6.5	17.0	14.5	17.5	15.0	16.5	12.5	15.0	14.5	10.0	9.5
30	9.5	7.0	17.0	14.5	17.0	15.0	17.0	13.5	16.0	14.5	9.5	9.5
31	---	---	15.5	12.5	---	---	18.5	14.5	17.0	15.0	---	---
MONTH	10.5	4.5	17.0	7.0	19.5	12.5	21.0	12.5	19.5	13.0	17.0	9.0

04128500 INDIAN RIVER AT INDIAN RIVER, MI

LOCATION.--Lat 45°24'38", long 84°37'12", in NE¼ SW¼ sec. 24, T. 35 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank in Indian River, 500 ft (152 m) downstream from Burt Lake, and 2.3 mi (3.7 km) upstream from Mullett Lake.

DRAINAGE AREA.--583 mi² (1,510 km²).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1942(M), 1945(M), 1947.

GAGE.--Water-stage recorder. Datum of gage is 590.21 ft (179.896 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 12, 1942, nonrecording gage at site 100 ft (30 m) downstream. Auxiliary water-stage recorder 14.3 mi (23.0 km) downstream from base gage, near Cheboygan, datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by dam at Cheboygan. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 570 ft³/s (16.14 m³/s), 13.28 in/yr (337 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,250 ft³/s (35.4 m³/s) May 3, 4, 1979; maximum daily gage height, 5.58 ft (1.701 m) May 13, 14, 1960; minimum daily discharge, 212 ft³/s (6.00 m³/s) September 2, 1970; minimum daily gage height, 3.34 ft (1.018 m) Oct. 21, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 672 ft³/s (19.0 m³/s) December 14; maximum daily gage height, 4.15 ft (1.265 m), Apr. 30, May 1; minimum daily discharge, 237 ft³/s (6.71 m³/s) August 6, 8; minimum daily gage height, 3.44 ft (1.049 m) Feb. 6, 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	404	480	593	588	488	588	588	668	436	463	276	288
2	400	462	632	589	495	602	590	647	423	475	280	343
3	403	455	606	586	503	612	620	621	424	486	284	390
4	381	483	576	583	499	620	614	635	410	496	290	431
5	346	476	578	563	498	633	658	653	409	505	270	416
6	312	452	577	557	498	635	637	656	425	500	237	389
7	319	468	574	555	500	641	617	628	399	492	238	355
8	331	461	585	553	505	644	632	633	367	463	237	401
9	346	462	574	549	506	652	623	632	404	480	238	394
10	334	491	592	549	517	655	622	644	406	470	248	386
11	361	496	617	547	527	660	616	639	414	450	260	398
12	381	492	640	549	531	658	603	626	407	441	270	419
13	379	512	660	551	527	671	580	596	386	457	300	422
14	374	537	672	542	524	660	612	572	395	443	306	434
15	383	550	671	543	523	662	564	563	398	420	316	447
16	380	554	669	541	529	669	549	564	414	406	335	463
17	354	565	662	537	528	659	566	569	447	385	326	459
18	355	571	667	532	531	660	589	560	438	358	327	410
19	375	568	659	533	533	666	574	539	495	330	328	399
20	377	562	656	527	533	662	600	518	522	317	329	393
21	413	591	652	522	536	659	566	499	540	338	328	378
22	444	566	647	520	531	659	571	486	559	316	313	383
23	431	586	647	515	535	649	620	478	536	305	275	364
24	430	613	638	514	534	638	658	461	526	298	287	346
25	453	597	626	505	533	621	631	449	524	304	284	326
26	475	583	623	508	542	610	625	433	503	339	283	309
27	467	596	618	498	555	602	635	437	489	322	275	260
28	474	601	611	500	583	587	649	427	448	330	277	355
29	471	603	604	499	---	586	656	427	440	300	270	340
30	429	587	596	493	---	584	664	453	464	275	302	335
31	474	---	597	488	---	590	---	439	---	267	293	---
TOTAL	12256	16020	19319	16636	14644	19694	18329	17152	13438	12231	8882	11433
MEAN	395	534	623	537	523	635	611	553	448	395	287	381
MAX	475	613	672	589	583	671	664	668	559	505	335	463
MIN	312	452	574	488	488	584	549	427	367	267	237	260
CFSM	.68	.92	1.07	.92	.90	1.09	1.05	.95	.77	.68	.49	.65
IN.	.78	1.02	1.23	1.06	.93	1.26	1.17	1.09	.86	.78	.57	.73

CAL YR 1980 TOTAL 198552 MEAN 542 MAX 715 MIN 280 CFSM .93 IN 12.67
WTR YR 1981 TOTAL 180034 MEAN 493 MAX 672 MIN 237 CFSM .85 IN 11.49

04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE¼ SW¼ sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi (17.9 km) east of Vanderbilt, and 26 mi (41.8 km) upstream from Mullett Lake.

DRAINAGE AREA.--63 mi² (160 km²), approximately.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 886.24 ft (270.126 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi (5.6 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 77.8 ft³/s (2.203 m³/s), 16.77 in/yr (426 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/ s) May 15, 1957, gage height, 6.80 ft (2.073 m), from floodmark, from rating curve extended above 500 ft³/s (14.2 m³/s), result of failure of Lansing Club Dam; minimum, 13 ft³/s (0.37 m³/s) Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 394 ft³/s (11.2 m³/s) Apr. 4, gage height, 4.83 ft (1.472 m); minimum, 24 ft³/s (0.68 m³/s) Dec. 3, 4, gage height, 1.60 ft (0.488 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	61	67	72	73	57	115	124	78	58	56	47	57
2	69	64	67	56	56	95	116	72	57	56	46	67
3	74	63	58	56	56	83	107	69	58	56	49	57
4	75	66	58	61	55	77	205	66	80	56	51	58
5	67	65	60	61	54	69	190	68	68	54	54	55
6	68	66	62	61	54	72	104	68	58	54	54	54
7	64	66	66	61	54	69	88	64	56	56	54	57
8	62	65	104	61	54	70	96	64	57	51	64	90
9	64	71	95	61	54	70	186	63	58	47	65	76
10	62	74	86	61	53	71	128	67	55	47	56	78
11	65	68	78	61	53	70	99	67	56	46	55	67
12	66	67	70	66	53	70	86	63	56	47	53	57
13	66	65	70	64	54	74	77	62	66	49	52	56
14	63	78	70	63	54	68	96	62	58	46	54	59
15	63	75	68	63	54	71	95	60	76	46	57	56
16	64	67	71	62	60	75	81	61	166	49	65	56
17	70	71	70	62	84	71	86	63	97	47	58	55
18	68	70	73	61	96	68	76	60	67	47	58	58
19	73	66	74	61	125	67	76	57	59	49	54	54
20	67	61	70	61	121	65	73	56	60	57	51	54
21	79	66	70	58	95	64	70	55	65	66	48	55
22	75	72	70	56	94	71	68	58	79	59	48	54
23	67	72	70	56	107	71	78	57	85	56	48	54
24	68	74	72	57	112	76	96	70	61	50	48	56
25	72	70	71	57	93	79	82	97	62	47	50	56
26	72	68	71	58	86	85	76	70	58	47	47	57
27	70	65	71	58	81	86	71	68	58	49	56	67
28	72	71	72	58	150	100	78	62	56	51	65	67
29	72	74	90	58	---	132	116	60	56	58	59	64
30	68	74	87	58	---	161	93	59	54	57	69	61
31	64	---	87	56	---	143	---	58	---	53	65	---
TOTAL	2110	2061	2273	1868	2119	2558	3018	2006	2000	1609	1700	1812
MEAN	68.1	68.7	73.3	60.3	75.7	82.5	101	64.7	66.7	51.9	54.8	60.4
MAX	79	78	104	73	150	161	206	97	166	66	69	90
MIN	61	61	58	56	53	64	68	55	54	46	46	54
CFSM	1.08	1.09	1.16	.96	1.20	1.31	1.60	1.03	1.06	.82	.87	.96
IN.	1.25	1.22	1.34	1.10	1.25	1.51	1.78	1.18	1.18	.95	1.00	1.07

CAL YR 1980 TOTAL 27224 MEAN 74.4 MAX 332 MIN 48 CFSM 1.18 IN 16.08
WTR YR 1981 TOTAL 25134 MEAN 68.9 MAX 206 MIN 46 CFSM 1.09 IN 14.84

04129500 PIGEON RIVER AT AFTON, MI

LOCATION.--Lat 45°22'26", long 84°30'54", in NW¼ NE¼ sec.2, T.34 N., R.2 W., Cheboygan County, Hydrologic Unit 04070004, on downstream side of bridge on State Highway 68, 0.9 mi (1.4 km) west of Afton, 2.2 mi (3.5 km) downstream from Wilkes Creek, and 7 mi (11 km) upstream from Mullett Lake.

DRAINAGE AREA.--159 mi² (412 km²).

PERIOD OF RECORD.--April 1942 to September 1981 (discontinued).

REVISED RECORDS.--WSP 1437: 1945-46, 1950.

GAGE.--Nonrecording gage. Altitude of gage 675 ft (206 m), by barometer. Prior to Oct. 1, 1961, at various sites upstream at present datum.

REMARKS.--Records fair except those for the winter period, which are poor. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam 22 mi (35 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 139 ft³/s (3.936 m³/s), 11.87 in/yr (301 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft³/s (33.1 m³/s) Apr. 17, 1960, gage height, 6.80 ft (2.073 m), from high-water mark; maximum gage height, about 10.5 ft (3.20 m) Mar. 31, 1943, from floodmarks, backwater from ice; minimum discharge, 45 ft³/s (1.27 m³/s) July 11, 12, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 288 ft³/s (8.16 m³/s) Apr. 5, gage height, 5.39 ft (1.643 m); maximum gage height, 6.16 ft (1.878 m) Mar. 1, backwater from ice; minimum discharge, 45 ft³/s (1.27 m³/s) July 11, 12, gage height, 4.39 ft (1.338 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	79	91	103	86	87	185	211	146	81	62	60	83
2	91	99	84	86	86	170	196	126	81	62	60	89
3	101	85	53	86	86	160	179	93	83	62	60	81
4	97	77	54	86	86	158	221	105	91	60	58	75
5	83	93	56	86	87	133	288	105	89	62	66	73
6	91	99	74	86	88	124	246	81	87	64	62	70
7	93	91	100	86	86	99	170	87	79	62	70	70
8	83	99	140	86	86	103	170	95	75	62	70	89
9	91	89	120	86	86	105	215	72	73	60	85	103
10	89	99	105	86	87	103	248	103	72	54	79	103
11	91	101	97	86	88	112	169	99	73	47	73	97
12	85	99	92	86	88	118	165	95	73	52	66	83
13	91	95	92	86	88	85	153	89	75	54	68	77
14	97	103	91	86	88	95	146	91	79	51	64	73
15	97	101	91	85	89	107	158	89	91	51	73	70
16	97	83	90	86	87	105	149	85	137	52	79	70
17	99	77	90	86	89	97	142	83	167	54	73	68
18	99	81	90	86	92	81	124	85	149	58	70	70
19	99	99	90	86	94	93	114	83	81	58	68	66
20	97	89	90	86	99	101	109	75	77	58	60	64
21	95	89	92	86	102	105	101	77	83	68	60	66
22	101	95	91	87	108	107	103	77	97	68	60	66
23	101	93	90	87	115	112	124	77	101	68	60	68
24	101	97	90	87	127	118	160	97	99	62	60	68
25	103	101	90	88	135	107	135	107	89	60	56	73
26	105	89	90	88	150	109	135	120	72	58	60	79
27	95	92	90	87	160	114	105	97	70	56	64	87
28	97	97	90	87	195	116	109	91	68	58	64	89
29	103	101	89	87	---	165	140	93	68	62	75	83
30	99	93	88	87	---	198	158	85	68	64	81	79
31	81	---	87	87	---	221	---	81	---	66	83	---
TOTAL	2931	2797	2789	2677	2859	3806	4843	2889	2628	1835	2087	2332
MEAN	94.5	93.2	90.0	86.4	102	123	161	93.2	87.6	59.2	67.3	77.7
MAX	105	103	140	88	195	221	288	146	167	68	85	103
MIN	79	77	53	85	86	81	101	72	68	47	56	64
CFSM	.59	.59	.57	.54	.64	.77	1.01	.59	.55	.37	.42	.49
IN.	.69	.65	.65	.63	.67	.89	1.13	.68	.61	.43	.49	.55

CAL YR 1980 TOTAL 41617 MEAN 114 MAX 333 MIN 53 CFSM .72 IN 9.74
WTR YR 1981 TOTAL 34473 MEAN 94.4 MAX 288 MIN 47 CFSM .59 IN 8.07

04130000 CHEBOYGAN RIVER NEAR CHEBOYGAN, MI

LOCATION.--Lat 45°34'38", long 84°29'15", in SW¼ sec.19, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, on right bank 300 ft (91 m) downstream from Mullett Lake, 2.4 mi (3.9 km) upstream from Black River, and 4.8 mi (7.7 km) south of Cheboygan.

DRAINAGE AREA.--865 mi² (2,240 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929. Auxiliary water-stage recorder 5.1 mi (8.2 km) downstream from base gage, in Cheboygan, datum of gage is 590.00 ft (179.832 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 30, 1967, nonrecording auxiliary gage in Cheboygan, 5.2 mi (8.4 km) downstream at present datum.

REMARKS.--Records good. Flow regulated by dam in Cheboygan; prior to Dec. 31, 1965, flow affected by variable backwater from powerplant in Cheboygan 5.2 mi (8.4 km) below station and by Alverno powerplant.

AVERAGE DISCHARGE.--39 years, 823 ft³/s (23.31 m³/s), 12.92 in/yr (328 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,970 ft³/s (55.8 m³/s) May 22, 1979; maximum daily gage height, 3.27 ft (0.997 m) May 13, 14, 1960; minimum daily discharge, 90 ft³/s (2.55 m³/s) Mar. 29, 30, 1958; minimum daily gage height, 1.05 ft (0.320 m) Apr. 13, 14, 15, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,240 ft³/s (35.1 m³/s) Apr. 3; maximum daily gage height, 2.63 ft (0.802 m) June 16; minimum daily discharge, 266 ft³/s (7.53 m³/s) Aug. 23, Sept. 25; minimum daily gage height, 1.34 ft (0.408 m) Mar. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	431	712	788	742	727	1040	881	1020	637	665	439	497
2	465	696	789	778	769	1120	963	937	492	835	452	870
3	480	714	795	795	844	1200	1240	920	594	825	453	1050
4	475	763	786	819	857	1200	837	928	512	826	421	986
5	463	789	806	808	845	1200	822	955	622	831	377	542
6	447	643	745	808	843	1200	880	965	629	802	323	344
7	481	627	748	823	844	1200	843	971	491	721	333	317
8	538	746	748	822	844	1190	748	1010	540	445	430	607
9	613	550	747	843	837	1180	657	947	729	682	485	789
10	606	771	765	852	851	1180	657	962	658	692	457	448
11	614	1060	789	869	866	1190	642	989	727	562	539	565
12	638	1050	769	874	865	1180	648	969	614	562	605	828
13	635	1040	885	869	855	1180	624	749	501	633	623	713
14	637	1040	933	846	842	1120	672	735	540	466	554	540
15	642	1050	828	822	821	1120	769	739	612	467	410	809
16	643	1050	723	828	799	1070	816	804	677	456	566	813
17	637	990	716	819	770	994	844	839	862	418	599	570
18	572	934	741	807	735	980	921	801	897	326	541	367
19	600	939	749	788	690	981	931	685	1010	330	495	338
20	624	938	741	780	728	979	978	602	1120	402	427	423
21	651	953	743	761	793	967	927	574	1040	491	428	415
22	624	944	741	756	778	964	1030	541	1000	473	342	423
23	637	928	732	747	798	880	1090	513	799	450	266	420
24	718	963	752	738	810	752	1090	485	599	438	371	330
25	695	898	747	721	804	740	1040	448	606	447	426	266
26	738	801	738	708	944	743	1030	475	587	507	383	286
27	691	807	750	713	1080	757	1030	518	548	466	314	335
28	717	828	734	723	1050	722	1040	563	530	424	426	733
29	706	820	739	728	---	740	1030	624	517	318	444	631
30	694	815	734	733	---	798	1030	768	571	369	375	448
31	665	---	743	733	---	884	---	747	---	442	327	---
TOTAL	18767	25859	23746	24453	23289	31451	26710	23783	20261	16771	13631	16753
MEAN	605	862	766	789	832	1015	890	767	675	541	440	558
MAX	738	1060	933	874	1080	1200	1240	1020	1120	835	623	1050
MIN	431	550	718	708	690	722	624	448	491	318	266	266
CFSM	.70	1.00	.89	.91	.96	1.17	1.03	.89	.78	.63	.51	.65
IN.	.81	1.11	1.02	1.05	1.00	1.35	1.15	1.02	.87	.72	.59	.72

CAL YR 1980 TOTAL 300757 MEAN 822 MAX 1260 MIN 393 CFSM .95 IN 12.93
WTR YR 1981 TOTAL 265474 MEAN 727 MAX 1240 MIN 266 CFSM .84 IN 11.42

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE¼ NE¼ sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft (122 m) downstream from Kleber Dam, 1,000 ft (305 m) upstream from Milligan Creek, 3.0 mi (4.8 km) northwest of Tower, and 10.8 mi (17.4 km) upstream from Black Lake.

DRAINAGE AREA.--313 mi² (811 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft (200.558 m) Stanley Engineering Co. datum. Prior to Aug. 1, 1949, at site 1 mi (1.6 km) upstream at different datum.

REMARKS.--Records good except those for the period of no gage-height record, June 2 to July 7, which are poor. Flow regulated by hydroelectric powerplant 400 ft (122 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 270 ft³/s (7.646 m³/s), 11.71 in/yr (297 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft³/s (66.3 m³/s) Apr. 17, 1960, gage height, 7.13 ft (2.173 m); minimum, 0.60 ft³/s (0.017 m³/s) Mar. 11, 1950; minimum daily, 4.0 ft³/s (0.11 m³/s) Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,330 ft³/s (37.7 m³/s) Sept. 1, gage height, 5.44 ft (1.658 m); minimum, 11 ft³/s (0.31 m³/s) May 1, gage height, 1.27 ft (0.387 m); minimum daily, 103 ft³/s (2.92 m³/s) Aug. 27, but may have been less during period of no gage-height record June 2 to July 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	168	192	187	202	167	438	422	291	177	112	134	286
2	175	143	187	168	170	439	422	411	170	112	139	196
3	200	184	142	182	173	436	420	236	150	105	126	187
4	235	191	149	183	174	350	444	259	160	110	147	180
5	230	191	147	148	173	296	529	234	180	135	203	195
6	240	215	183	146	170	298	545	248	155	160	157	143
7	235	199	230	148	168	275	523	235	155	150	142	147
8	232	166	306	149	167	238	490	233	155	150	143	192
9	232	166	250	190	168	238	488	180	120	144	155	178
10	230	188	246	178	168	240	499	183	118	133	171	198
11	190	187	203	222	172	257	510	186	118	134	138	218
12	190	201	152	178	174	240	487	184	118	133	138	218
13	190	189	154	187	191	238	449	237	118	133	138	210
14	190	205	180	179	196	270	418	213	290	136	137	206
15	190	191	184	191	179	254	360	169	330	137	138	143
16	190	210	179	179	146	238	361	191	330	136	138	139
17	190	243	186	181	172	235	362	186	320	127	150	135
18	188	243	192	179	205	288	310	185	330	122	164	136
19	225	188	191	179	336	211	286	192	270	121	162	126
20	280	154	187	179	389	230	264	165	235	119	173	127
21	235	154	182	179	392	228	262	171	260	117	144	128
22	245	181	202	179	429	183	262	170	200	120	147	129
23	207	228	209	178	438	180	263	169	220	119	137	129
24	198	210	204	179	436	278	282	169	230	119	117	129
25	180	206	212	176	438	234	369	192	210	125	119	126
26	180	197	194	177	442	269	298	240	190	139	112	160
27	197	169	176	189	378	298	292	239	160	131	103	178
28	223	190	175	213	387	293	292	206	145	130	111	183
29	216	192	145	213	---	290	358	159	155	131	112	182
30	211	190	206	203	---	418	357	180	175	133	110	135
31	211	---	202	173	---	389	---	186	---	132	174	---
TOTAL	6503	5763	6037	5604	7198	8769	11624	6499	5944	4005	4379	5039
MEAN	210	192	195	181	257	283	387	210	198	129	141	168
MAX	280	243	306	222	442	439	545	411	330	160	203	286
MIN	168	143	142	146	146	180	262	159	118	105	103	126
CFSM	.67	.61	.62	.58	.82	.90	1.24	.67	.63	.41	.45	.54
IN.	.77	.68	.72	.67	.86	1.04	1.38	.77	.71	.48	.52	.60

CAL YR 1980 TOTAL 95633 MEAN 261 MAX 1150 MIN 138 CFSM .83 IN 11.37
WTR YR 1981 TOTAL 77364 MEAN 212 MAX 545 MIN 103 CFSM .68 IN 9.20

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW¼ NE¼ sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi (2.8 km) upstream from mouth.

DRAINAGE AREA.--1,500 mi² (3,900 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981 (discontinued).
WATER TEMPERATURES: October 1974 to September 1981 (discontinued).

INSTRUMENTATION.--Water-quality monitor October 1976 to September 1981 (discontinued).

REMARKS.--In addition to water-quality monitor, samples were collected near monitor site by a local observer on an approximate twice-weekly basis. Interruptions in the record were due to malfunctions of the instrument. Flow regulated by dam 1,000 ft (305 m) downstream.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1976-81): Maximum, 424 micromhos Jan. 21, 1976; minimum, 248 micromhos Apr. 5, 1981.
WATER TEMPERATURES (water years 1976-81): Maximum, 27.0°C July 20, 1977, July 8, 12, 13, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance values 800, 850 and 900 micromhos Apr. 7, 8, 24, 25, 1975 and 140 micromhos Mar. 8, 1975, were observed.*

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 333 micromhos Jan. 4, 28, Feb. 1, 12; minimum, 248 micromhos Apr. 5.
WATER TEMPERATURES: Maximum, 27.0°C July 8, 12, 13; minimum, 0.0°C on many days during winter period.

* These values are questionable due to possible changes in sampling location.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 09...	0900	753	300	8.2	10.5	9.9	88	41	K3	140	2	37
NOV 06...	1100	999	305	8.3	5.5	12.2	103	K20	<1	160	11	42
DEC 09...	1130	1070	324	8.2	1.0	14.3	102	K8	K7	150	4	42
JAN 08...	1030	--	343	8.2	.0	--	--	51	K18	160	0	44
FEB 17...	1130	F1010	331	8.2	.5	13.6	94	K10	K8	170	11	47
MAR 26...	0930	1230	306	8.2	4.0	14.3	110	25	K1	160	4	45
APR 13...	1130	1530	284	8.2	8.5	11.2	101	K14	K11	150	11	41
MAY 07...	0930	1720	288	8.3	11.0	12.2	110	K6	K3	170	22	46
JUN 08...	1130	876	292	8.1	19.0	10.1	113	49	44	170	22	46
JUL 09...	0930	710	271	8.0	25.0	9.3	112	K10	K16	150	11	40
AUG 05...	1300	415	282	7.6	23.0	8.5	99	K9	40	160	21	41
SEP 14...	1130	952	279	8.1	19.5	8.9	97	120	190	150	2	38

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCT/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 09...	12	3.9	6	.1	.8	--	180	0	150	1.7	10
NOV 06...	13	3.4	5	.1	.8	--	180	0	150	1.5	12
DEC 09...	12	3.6	5	.1	.7	--	160	0	130	1.8	13
JAN 08...	12	3.6	4	.1	.8	--	190	0	160	2.0	13
FEB 17...	13	4.0	5	.1	.8	.60	190	0	160	2.0	12
MAR 26...	12	3.8	5	.1	.8	.60	190	0	160	1.7	13
APR 13...	11	3.0	4	.1	.8	.60	170	0	140	1.7	12
MAY 07...	13	4.0	5	.1	.7	.50	180	0	150	1.5	10
JUN 08...	13	4.3	5	.1	.8	.60	180	0	150	2.3	10
JUL 09...	13	3.9	5	.1	.8	.60	170	0	140	2.7	12
AUG 05...	13	4.2	6	.1	.7	.50	170	0	140	6.9	12
SEP 14...	13	3.8	5	.1	.8	--	180	0	140	2.2	12

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
09...	4.7	.2	7.3	175	160	356	.02	.02	.030	.020	.04
NOV											
06...	4.5	.2	7.0	193	172	521	.04	.04	.020	.020	.02
DEC											
09...	5.0	.2	7.3	188	174	543	.06	.05	.020	--	--
JAN											
08...	5.1	.2	7.6	185	183	--	.08	.08	.010	.010	--
FEB											
17...	5.3	.2	8.0	193	187	E526	.10	.10	.030	--	--
MAR											
26...	4.3	.2	8.4	174	178	578	.10	.10	.030	--	--
APR											
13...	4.6	.2	6.6	180	164	744	.15	.13	.070	.040	--
MAY											
07...	4.4	.2	7.0	188	176	873	.03	.02	.030	.030	--
JUN											
08...	4.8	.2	6.5	189	176	447	.02	.02	.040	.040	--
JUL											
09...	5.1	.2	7.0	171	166	328	.02	.02	.030	.030	--
AUG											
05...	5.1	.2	8.1	183	169	205	.01	.01	.030	.030	--
SEP											
14...	4.9	.2	7.3	178	164	458	.02	.02	.040	.040	--

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
09...	.31	.34	.36	1.6	.010	.03	.010	--	4	8.1	100
NOV											
06...	.07	.09	.13	.58	.010	.03	.000	5.4	2	5.4	100
DEC											
09...	.12	.14	.20	.89	.000	.00	.000	--	2	5.8	100
JAN											
08...	.26	.27	.35	1.6	.020	.06	.000	5.1	--	--	--
FEB											
17...	.28	.31	.41	1.8	.070	.21	.010	4.1	1	E2.7	100
MAR											
26...	.13	.16	.26	1.2	.020	.06	<.010	--	4	13	100
APR											
13...	.25	.32	.47	2.1	.030	.09	.010	9.3	6	25	100
MAY											
07...	.27	.30	.33	1.5	.010	.03	<.010	6.3	2	9.3	100
JUN											
08...	.20	.24	.26	1.2	<.010	.03	<.010	--	6	14	100
JUL											
09...	.32	.32	.34	1.5	<.010	.03	<.010	5.9	3	5.8	100
AUG											
05...	.14	.17	.18	.80	.030	.09	<.010	5.5	3	3.4	100
SEP											
14...	.38	.42	.44	1.9	.020	.06	<.010	--	5	13	100

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 09...	0900	5	6	100	30	0	0	20	20	0	0
DEC 09...	1130	1	1	<50	30	3	3	10	10	1	1
MAR 25...	0930	0	0	100	100	0	0	10	<10	0	0
JUN 08...	1130	0	0	100	9	1	1	10	10	1	0
SEP 14...	1130	2	2	100	<50	1	1	30	20	2	<1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 09...	4	1	40	0	0	0	10	1	.3	<.1
DEC 09...	5	2	70	0	4	1	10	1	.3	.3
MAR 25...	3	2	100	20	16	2	10	10	.5	<.1
JUN 08...	6	5	80	<10	9	0	10	<1	<.1	<.1
SEP 14...	6	2	140	30	4	3	10	<10	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 09...	2	0	0	0	0	0	10	1	13	.4
DEC 09...	4	1	0	0	0	0	30	0	10	.2
MAR 25...	1	1	0	0	0	0	30	10	6.1	.3
JUN 08...	6	2	0	0	0	0	20	<4	5.5	.4
SEP 14...	4	2	<1	<1	<1	<1	40	10	4.4	.2

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04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 6.80	MAR 26.81	MAY 7.81	JUN 8.81
TIME	1100	0930	0930	1130
TOTAL CELLS/ML	3000	65	3900	2700
DIVERSITY: DIVISION	0.5	0.0	1.3	1.2
.CLASS	0.5	0.0	1.3	1.8
..ORDER	0.6	0.0	2.2	2.3
...FAMILY	0.6	0.7	2.4	2.6
....GENUS	0.7	0.7	2.5	2.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	*	0	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	100	3	--	-
...OOCYSTACEAE								
....OOCYSTIS	--	-	--	-	--	-	--	-
...RADIOCOCCACEAE								
....RADIOCOCCUS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	26	1	--	-	--	-	28	1
..TETRASPORALES								
...GLOEOCYSTACEAE								
....GLOEOCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	*	0	--	-	--	-	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	*	0	--	-	1500*	38	580*	21
....MELOSIRA	39	1	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	50	1	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	13*	20	--	-	14	1
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....OPEPHORA	--	-	--	-	--	-	14	1
...FRAGILARIACEAE								
....ASTERIONELLA	130	4	--	-	--	-	110	4
....FRAGILARIA	*	0	--	-	50	1	--	-
....SYNEDRA	*	0	52*	80	700*	18	28	1
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	25	1	14	1
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	150	4	55	2
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...DINOBRYACEAE								
....DINOBRYON	--	-	--	-	--	-	890*	33
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	83	3
...SYNURACEAE								
....MALLOMONAS	--	-	--	-	--	-	14	1
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	150	4	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	*	0	--	-	--	-	69	3

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 6,80		MAR 26,81		MAY 7,81		JUN 8,81	
TIME	1100		0930		0930		1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	*	0	--	-	25	1	620#	23
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
..NOSTOCALES								
...NOSTOCACEAE								
....APHANIZOMENON	2700#	91	--	-	550	14	190	7
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	600#	15	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	14	1
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 9,81	AUG 5,81	SEP 14,81
TIME	0930	1300	1130
TOTAL CELLS/ML	700	430	4200
DIVERSITY: DIVISION	1.5	1.0	1.3
.CLASS	1.6	1.0	1.4
..ORDER	1.9	1.4	1.7
...FAMILY	2.0	1.5	1.9
....GENUS	2.0	1.7	2.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAF						
....SCHROEDERIA	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	*	0
...OOCYSTACEAE						
....OOCYSTIS	--	-	14	3	*	0
...RADIOCOCCACEAE						
....RADIOCOCCUS	--	-	--	-	83	2
...SCENEDESMACEAE						
....CRUCIGENIA	52	7	--	-	--	-
....SCENEDESMUS	--	-	29	7	--	-
..TETRASPORALES						
...GLOEOCYSTACEAE						
....GLOEOCYSTIS	--	-	--	-	150	4
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	14	3	--	-
...PHACOTACEAE						
....PHACOTUS	--	-	--	-	55	1
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	300#	43	29	7	97	2
....MELOSIRA	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	83	2
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
...CYMBELLACEAE						
....CYMBELLA	--	-	--	-	*	0
...DIATOMACEAE						
....OPEPHORA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	13	2	290#	67	970#	23
....SYNEDRA	26	4	14	3	*	0
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	--	-	*	0
...NAVICULACEAE						
....NAVICULA	--	-	--	-	41	1
...NITZSCHIACEAE						
....NITZSCHIA	13	2	--	-	*	0
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...DINOBRYACEAE						
....DINOBRYON	--	-	--	-	55	1
...OCHROMONADACEAE						
....OCHROMONAS	--	-	--	-	41	1
...SYNURACEAE						
....MALLOMONAS	13	2	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	43	10	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	13	2	--	-	--	-

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 9,81		AUG 5,81		SEP 14,81	
TIME	0930		1300		1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	260#	37	--	-	570	13
....GOMPHOSPHAERIA	--	-	--	-	1900#	45
..NOSTOCALES						
...NOSTOCACEAE						
....APHANIZOMENON	--	-	--	-	--	-
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GLENODINIACEAE						
....GLENODINIUM	13	2	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	326	321	324	315	302	308	325	309	318
2	---	---	---	328	320	324	316	304	309	328	316	323
3	---	---	---	327	311	322	319	302	310	328	325	326
4	---	---	---	323	307	316	309	299	302	333	322	329
5	---	---	---	328	319	324	311	300	306	327	320	323
6	---	---	---	329	317	322	309	295	302	319	306	314
7	---	---	---	328	322	325	306	290	297	325	318	321
8	---	---	---	329	325	327	310	300	306	328	322	326
9	---	---	---	327	317	324	315	308	312	324	317	321
10	308	303	305	328	323	327	315	304	311	327	321	325
11	305	293	298	327	323	325	316	315	315	330	326	328
12	310	295	301	326	319	323	317	304	312	331	325	329
13	312	305	309	321	311	315	316	306	314	324	315	321
14	312	306	310	322	309	315	321	315	318	319	311	316
15	312	297	305	318	310	315	324	313	321	323	315	319
16	309	298	305	319	309	315	325	319	323	324	318	320
17	309	294	302	319	307	313	328	315	323	330	321	325
18	313	302	309	320	310	316	327	309	319	327	292	317
19	313	293	308	317	306	310	327	326	326	325	302	318
20	313	300	307	317	301	311	328	326	327	324	320	321
21	312	299	307	318	308	314	329	327	328	331	320	326
22	319	308	314	318	311	314	328	323	325	325	317	321
23	321	316	320	318	312	315	324	313	319	323	319	321
24	322	318	320	317	311	314	327	317	322	329	321	325
25	322	317	320	316	305	312	328	323	326	328	318	324
26	323	319	322	315	301	310	329	320	323	328	323	325
27	324	321	323	316	308	313	328	322	326	330	328	329
28	325	320	323	310	301	306	327	311	320	333	329	331
29	325	318	322	310	301	306	319	312	317	331	327	330
30	322	313	318	310	301	306	322	316	320	332	323	328
31	322	316	319	---	---	---	323	317	320	331	326	328
MONTH				329	301	317	329	290	316	333	292	323

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	333	319	326	315	311	313	293	281	286	289	284	287
2	331	321	328	316	314	315	284	274	279	291	283	288
3	332	327	330	315	313	314	280	271	278	289	285	287
4	331	327	329	315	311	313	269	260	266	288	284	285
5	332	324	328	316	310	313	260	248	252	288	285	286
6	329	324	327	317	315	316	269	260	265	289	283	287
7	330	324	327	318	312	315	276	269	273	289	286	288
8	328	322	325	318	312	315	278	274	276	289	286	288
9	329	322	327	318	310	313	273	270	272	291	288	290
10	328	315	324	317	311	314	273	266	270	293	289	291
11	328	322	327	316	309	312	268	264	266	293	289	291
12	333	324	328	316	309	312	273	266	270	292	288	291
13	329	323	326	317	313	316	275	269	272	293	288	291
14	327	316	323	317	313	315	282	273	277	292	286	289
15	325	319	322	317	304	313	284	278	282	292	285	289
16	324	318	322	313	309	312	286	279	281	293	286	290
17	323	310	318	313	311	312	282	275	279	293	286	290
18	325	302	317	312	310	311	285	280	283	290	285	288
19	319	310	316	313	311	312	285	280	283	294	286	289
20	319	315	317	314	308	311	287	284	285	293	288	290
21	320	314	317	313	307	310	289	285	287	296	289	292
22	319	307	315	316	310	313	289	286	288	294	286	291
23	304	296	300	316	311	313	289	286	287	295	291	293
24	308	299	304	316	310	313	287	267	280	298	284	293
25	314	308	311	315	311	313	289	268	281	302	294	297
26	315	310	313	316	306	312	289	286	287	299	294	295
27	317	312	315	307	301	304	288	285	287	301	292	295
28	314	310	313	308	302	305	287	285	287	297	290	294
29	---	---	---	307	297	302	286	282	285	296	290	293
30	---	---	---	299	282	292	288	284	287	296	292	294
31	---	---	---	294	285	289	---	---	---	295	289	293
MONTH	333	296	321	318	282	311	293	248	278	302	283	290

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	295	288	293	290	281	285	292	275	285	295	281	288
2	297	289	295	287	279	283	294	277	289	288	281	286
3	297	288	293	290	279	284	294	282	289	293	282	288
4	297	288	293	292	281	285	297	284	291	297	289	293
5	300	292	295	293	280	286	298	279	291	297	284	293
6	298	292	295	289	278	283	295	279	290	299	287	295
7	324	293	298	289	277	282	293	282	289	297	284	292
8	298	289	294	289	277	283	294	274	286	292	282	287
9	297	293	296	290	272	283	294	279	288	294	281	287
10	297	291	294	289	277	284	295	279	288	294	281	287
11	295	289	293	289	274	283	292	277	287	294	280	288
12	296	286	292	286	274	282	293	281	288	296	280	290
13	296	291	294	296	281	286	297	285	293	296	281	291
14	296	288	292	301	286	293	296	278	290	297	283	292
15	295	280	288	304	284	296	296	282	290	296	286	291
16	289	282	285	301	282	293	294	283	289	295	286	291
17	289	279	285	299	290	295	300	281	291	297	290	293
18	290	283	287	298	280	289	296	279	290	296	286	291
19	288	281	285	299	279	290	294	279	288	297	285	291
20	289	281	286	300	286	294	294	279	286	296	281	290
21	288	280	285	296	284	291	294	279	287	299	290	295
22	291	279	284	301	285	292	292	279	286	297	287	292
23	290	280	285	293	284	289	292	282	287	298	287	293
24	292	275	285	293	277	286	296	280	289	298	289	293
25	292	283	288	291	275	284	297	282	290	300	292	298
26	288	282	285	291	283	287	294	281	288	299	288	294
27	287	282	285	295	285	289	293	282	289	298	291	295
28	290	281	285	291	285	289	298	290	295	298	289	294
29	289	280	284	296	272	285	297	283	292	300	292	298
30	290	277	283	293	271	285	295	280	290	300	295	298
31	---	---	---	293	276	286	297	281	291	---	---	---
MONTH	324	275	289	304	271	287	300	274	289	300	280	292

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	6.0	5.0	5.5	2.0	1.0	1.5	.0	.0	.0
2	---	---	---	5.5	5.0	5.5	1.0	1.0	1.0	.0	.0	.0
3	---	---	---	6.0	5.0	5.5	.5	.0	.5	.0	.0	.0
4	---	---	---	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0
5	---	---	---	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0
6	---	---	---	6.0	5.0	5.5	.5	.0	.0	.0	.0	.0
7	---	---	---	5.5	4.5	5.0	.5	.5	.5	.0	.0	.0
8	---	---	---	6.0	4.0	5.0	1.0	.5	.5	.0	.0	.0
9	---	---	---	6.0	4.0	5.0	1.0	1.0	1.0	.0	.0	.0
10	11.0	9.5	10.5	4.0	3.5	4.0	1.0	1.0	1.0	.0	.0	.0
11	11.0	9.5	10.5	4.0	2.5	3.5	1.0	.5	.5	.0	.0	.0
12	10.0	8.5	9.5	4.5	2.5	3.5	.5	.0	.0	.0	.0	.0
13	9.5	8.5	8.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
14	9.0	8.0	8.5	4.0	2.5	3.5	.0	.0	.0	.0	.0	.0
15	9.0	8.0	8.5	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0
16	9.0	8.5	8.5	4.0	2.0	2.5	.0	.0	.0	.0	.0	.0
17	10.5	8.5	9.5	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
18	9.0	8.5	9.0	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
19	9.0	8.5	9.0	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
20	9.0	8.5	8.5	4.0	2.0	2.5	.0	.0	.0	.0	.0	.0
21	8.5	8.0	8.0	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
22	8.5	7.5	8.0	4.0	2.0	2.5	.0	.0	.0	.0	.0	.0
23	8.5	7.5	8.0	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
24	9.0	7.5	8.0	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0
25	8.0	7.5	8.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
26	7.5	6.5	7.0	2.5	1.0	1.5	.0	.0	.0	.0	.0	.0
27	6.5	6.0	6.5	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
28	6.5	5.5	6.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
29	6.0	5.5	6.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
30	6.0	5.5	5.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
31	6.0	5.5	5.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH				6.0	1.0	3.5	2.0	.0	.0	.0	.0	.0

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.5	.5	.5	6.5	5.5	6.0	10.0	8.0	8.5
2	.0	.0	.0	.5	.5	.5	8.0	4.5	6.0	10.0	8.0	9.0
3	.0	.0	.0	.5	.5	.5	7.0	5.5	6.5	10.5	8.5	9.5
4	.0	.0	.0	.5	.5	.5	10.0	6.0	7.5	12.0	9.5	10.5
5	.0	.0	.0	.5	.5	.5	6.5	5.0	6.0	11.5	10.5	10.5
6	.0	.0	.0	.5	.5	.5	6.5	4.0	5.0	12.0	9.5	10.5
7	.0	.0	.0	.5	.5	.5	7.5	3.5	5.0	12.5	10.0	10.5
8	.0	.0	.0	1.0	.5	.5	6.5	5.0	6.0	12.0	10.0	11.0
9	.0	.0	.0	1.5	.5	1.0	8.0	6.0	7.0	13.5	10.5	11.5
10	.0	.0	.0	1.0	.5	1.0	8.5	6.5	7.5	10.5	10.0	10.5
11	.0	.0	.0	1.0	.5	.5	9.5	8.0	8.5	9.5	8.5	9.0
12	.0	.0	.0	2.0	.5	1.0	9.5	8.0	8.5	8.5	8.0	8.0
13	.0	.0	.0	1.5	.5	1.0	9.5	8.5	9.0	8.0	7.5	8.0
14	.0	.0	.0	1.5	.5	1.0	9.5	8.0	9.0	10.0	7.5	8.5
15	.0	.0	.0	2.0	.5	1.0	8.5	7.0	8.0	11.0	8.5	9.5
16	.0	.0	.0	1.5	.5	1.0	9.0	6.0	7.5	12.0	9.0	10.5
17	.0	.0	.0	1.5	.5	1.0	9.0	7.5	8.0	12.0	9.5	10.5
18	.0	.0	.0	1.0	.5	1.0	8.5	7.5	8.0	12.5	9.5	11.0
19	.0	.0	.0	1.5	.5	1.0	8.5	7.0	7.5	13.0	9.5	11.0
20	.0	.0	.0	2.0	1.0	1.0	7.5	6.0	6.5	14.0	10.0	12.0
21	.0	.0	.0	3.0	1.0	1.5	8.0	5.5	6.5	15.0	11.5	13.0
22	.0	.0	.0	3.5	1.5	2.0	7.5	5.5	6.5	15.0	12.0	13.5
23	.0	.0	.0	3.5	1.5	2.5	6.5	6.0	6.0	16.5	13.0	15.0
24	.0	.0	.0	5.5	2.0	3.5	6.5	5.5	6.0	17.5	14.5	16.0
25	.0	.0	.0	6.0	3.0	4.0	7.5	5.5	6.5	18.5	15.0	17.0
26	.0	.0	.0	4.0	3.0	3.5	7.5	6.0	6.5	17.0	15.0	16.0
27	.5	.0	.0	6.0	3.0	4.0	8.0	6.0	7.0	17.0	15.5	16.0
28	.5	.0	.0	6.5	3.5	5.0	7.5	7.0	7.5	18.0	15.5	16.5
29	---	---	---	6.0	4.5	5.5	8.5	7.0	7.5	18.0	15.5	17.0
30	---	---	---	6.5	5.0	5.5	10.0	7.5	8.0	18.0	15.5	16.5
31	---	---	---	6.5	5.0	5.5	---	---	---	18.0	15.0	16.0
MONTH	.5	.0	.0	6.5	.5	2.0	10.0	3.5	7.0	18.5	7.5	12.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.5	15.0	15.5	22.5	20.0	21.0	24.0	22.0	23.0	24.0	22.0	23.0
2	17.0	14.5	15.5	23.0	21.5	22.0	24.5	23.0	23.5	22.0	21.0	22.0
3	18.0	15.0	16.5	24.5	22.0	23.0	24.5	23.5	24.0	22.5	21.0	21.5
4	18.0	16.0	17.0	23.5	22.0	23.0	24.5	23.5	24.0	21.5	21.0	21.0
5	20.0	16.5	18.0	24.0	22.0	23.0	24.5	22.5	23.5	21.5	20.5	21.0
6	19.0	16.5	18.0	25.0	22.0	23.5	24.5	23.0	23.5	21.0	20.5	21.0
7	19.0	16.5	18.0	26.0	23.0	24.5	24.0	23.5	23.5	21.5	20.0	21.0
8	20.0	18.0	19.0	27.0	24.0	25.5	24.0	23.5	23.5	21.0	19.5	20.5
9	20.5	18.0	19.0	26.0	23.5	25.0	24.0	22.5	23.5	20.5	19.0	19.5
10	20.0	18.0	18.5	26.5	23.5	25.0	24.0	23.0	23.5	20.5	19.0	19.5
11	20.5	18.0	19.0	26.5	24.5	25.0	24.0	22.5	23.5	20.5	19.0	19.5
12	20.5	18.5	19.0	27.0	25.0	25.5	23.5	22.5	23.0	21.0	19.0	20.0
13	20.5	18.5	19.5	27.0	25.0	26.0	23.0	22.5	23.0	21.5	19.5	20.5
14	21.5	20.0	20.5	25.5	23.5	24.5	23.5	22.5	23.0	21.0	19.5	20.0
15	23.5	21.0	22.0	26.0	23.5	24.5	23.5	22.0	23.0	20.5	19.0	19.5
16	22.0	21.0	21.5	25.0	23.5	24.5	23.0	21.5	22.0	19.0	18.0	18.5
17	22.0	20.5	21.0	24.0	23.5	24.0	23.0	21.0	22.0	18.5	17.0	17.5
18	22.0	20.5	21.0	25.0	23.5	24.5	23.0	20.5	22.0	17.5	16.0	16.5
19	21.5	20.0	20.5	26.0	23.5	24.5	23.0	21.0	22.0	18.0	16.0	16.5
20	21.5	20.0	20.5	26.5	24.5	25.5	23.5	20.5	22.0	17.0	15.0	16.0
21	21.5	19.5	20.0	25.0	23.0	24.0	23.5	21.5	22.5	16.0	15.0	15.5
22	20.5	19.0	19.5	25.0	22.0	23.5	23.5	21.5	22.5	15.5	14.5	15.0
23	21.0	18.5	19.5	24.0	22.5	23.5	24.0	22.0	23.0	15.5	14.0	15.0
24	22.0	19.0	20.0	24.5	23.0	23.5	23.0	22.5	22.5	15.5	14.0	15.0
25	20.0	18.5	19.5	24.5	23.0	24.0	23.5	21.0	22.5	15.5	15.0	15.0
26	20.5	18.5	19.0	24.0	22.5	23.0	23.5	21.5	22.5	15.5	15.0	15.5
27	21.0	18.5	19.5	23.5	21.0	22.5	23.5	22.5	23.0	15.5	14.0	14.5
28	21.0	18.5	20.0	22.5	21.5	21.5	22.5	22.0	22.5	15.0	13.0	13.5
29	21.5	20.0	20.5	23.0	20.5	22.0	23.0	22.5	22.5	13.5	12.5	13.0
30	21.5	19.5	20.5	23.5	21.0	22.0	23.0	22.0	22.5	12.5	12.5	12.5
31	---	---	---	23.5	22.0	23.0	23.0	22.0	22.5	---	---	---
MONTH	23.5	14.5	19.5	27.0	20.0	24.0	24.5	20.5	23.0	24.0	12.5	18.0

04135000 THUNDER BAY RIVER NEAR ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°05'39", long 83°29'50", in SW¼ SE¼ sec.7, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, on left bank 1,000 ft (305 m) downstream from Alpena Power Company Fourmile Dam, 2.5 mi (4.0 km) upstream from Bagley Street in Alpena and 6.0 mi (9.7 km) upstream from mouth.

DRAINAGE AREA.--1,238 mi^2 (3,206 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional measurements made water years 1945-50. October 1979 to current year.

GAGE.--Two water-stage recorders. Altitude of gage on main (north) channel and secondary gage on (south) channel is 615 ft (187 m), from topographic map.

REMARKS.--Water-discharge records fair. Flow regulated at all stages by hydroelectric plant 1,000 ft (305 m) above station.

COOPERATION.--Supplemental record furnished by Alpena Power Co.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,760 ft^3/s (49.8 m^3/s) April 9-12, 17, May 2, 3, 1980; minimum daily, 33 ft^3/s (0.93 m^3/s) October 4, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1490 ft^3/s (42.2 m^3/s) April 14; minimum daily, 33 ft^3/s (0.93 m^3/s) October 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	554	154	602	511	257	1330	1400	1140	663	546	132	622
2	559	150	710	758	826	1350	1380	1170	584	566	56	658
3	569	608	536	508	632	1350	1290	970	566	557	635	629
4	33	561	587	508	661	1420	1140	785	645	52	556	857
5	114	655	566	691	629	1470	1120	1010	656	87	509	97
6	589	646	207	625	633	1290	1110	774	104	415	497	60
7	629	580	730	659	239	859	1130	722	116	531	509	318
8	529	152	888	734	266	959	1150	691	621	640	103	872
9	592	438	888	690	750	1100	1280	116	619	621	94	666
10	517	866	879	465	641	1230	1460	109	551	623	514	666
11	120	550	917	367	656	1090	1460	624	527	50	521	671
12	126	662	709	624	644	1030	1480	779	592	102	479	483
13	510	697	336	666	626	1240	1470	1020	40	611	478	267
14	568	885	318	522	129	572	1490	827	44	582	506	641
15	555	404	710	601	274	309	1470	869	700	534	81	699
16	548	120	672	635	758	795	1250	121	828	558	67	671
17	451	651	744	445	710	663	879	301	855	520	456	596
18	114	637	635	445	836	697	963	818	627	52	489	667
19	260	692	646	650	725	709	562	714	1000	61	455	93
20	676	653	511	640	998	666	722	628	1100	543	429	83
21	557	704	400	652	1090	102	990	606	839	534	562	678
22	566	498	731	637	1090	237	791	673	669	616	91	646
23	560	309	640	610	1090	948	770	99	695	633	63	608
24	551	670	729	439	1110	676	1020	131	646	673	437	454
25	124	700	747	439	1180	653	1080	140	578	52	444	708
26	119	679	673	772	1290	751	1150	458	566	95	509	139
27	542	510	337	685	1350	1020	1110	565	251	596	418	107
28	570	731	598	605	1340	430	1020	572	418	643	566	588
29	616	504	721	650	---	687	1050	640	513	526	99	508
30	636	396	731	765	---	1240	1120	136	486	548	70	446
31	696	---	667	210	---	1300	---	232	---	598	537	---
TOTAL	14150	16462	19755	18208	21430	28173	34307	18440	17099	13765	11362	15198
MEAN	456	549	637	587	765	909	1144	595	570	444	367	507
MAX	696	885	917	772	1350	1470	1490	1170	1100	673	635	872
MIN	33	120	207	210	129	102	562	99	40	50	56	60
CFSM	.37	.44	.52	.47	.62	.73	.92	.48	.46	.36	.30	.41
IN.	.43	.49	.59	.55	.64	.85	1.03	.55	.51	.41	.34	.46

CAL YR 1980 TOTAL 249512 MEAN 682 MAX 1760 MIN 33 CFSM .55 IN 7.50
WTR YR 1981 TOTAL 228349 MEAN 626 MAX 1490 MIN 33 CFSM .51 IN 6.86

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1979 to current year.
WATER TEMPERATURE: October 1979 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1980.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Interruptions in the record were due to malfunctions of the instrument. Occasional samples are collected at Bagley Street bridge, 2.5 mi (4.0 km) downstream. Water-discharge measurements are made at times of monthly sampling. February 1979 to September 1979 at site 6.9 mi (11.1 km) downstream (04135020).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum 465 micromhos December 27, 1980; minimum, 229 micromhos August 30, 1981.
WATER TEMPERATURES: Maximum, 31.0°C July 11, 12, 1981; minimum, 0.0°C on many days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 465 micromhos December 27; minimum, 229 micromhos August 30.
WATER TEMPERATURES: Maximum, 31.0°C July 11, 12; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
08...	0730	36	326	8.2	10.5	9.8	90	K4	<1	170	0	43
NOV												
05...	0900	867	381	8.3	4.5	12.4	97	<1	<2	200	20	54
DEC												
10...	1000	860	397	8.0	.0	13.4	93	46	22	190	1	51
JAN												
07...	1030	864	437	7.9	.0	--	--	K4	K3	210	5	59
FEB												
18...	1000	459	431	7.9	.0	9.2	64	K4	K3	220	8	61
MAR												
25...	0930	495	346	8.0	1.0	12.5	88	K2	<1	180	8	52
APR												
14...	0930	1460	316	8.2	10.5	10.2	92	K9	K4	170	22	48
MAY												
06...	1000	856	341	8.1	11.5	9.3	85	K3	K14	200	36	57
JUN												
09...	0945	848	358	8.0	19.5	8.0	90	K6	K23	200	20	54
JUL												
08...	0800	51	305	8.1	24.0	8.3	99	K3	45	170	6	46
AUG												
06...	0845	45	300	7.6	23.0	9.0	106	K2	K2	170	22	43
SEP												
15...	1200	1190	311	7.8	19.5	9.4	103	K2	K5	170	6	43

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
08...	14	5.8	7	.2	.8	--	210	0	170	2.1	10
NOV											
05...	15	5.6	6	.2	.9	.70	220	0	180	1.8	11
DEC											
10...	14	5.5	6	.2	.8	.60	230	0	190	3.7	13
JAN											
07...	15	5.3	5	.2	.9	.70	250	0	200	5.0	15
FEB											
18...	16	5.9	6	.2	.9	.70	260	0	210	5.2	11
MAR											
25...	13	4.2	5	.1	.9	.70	210	0	170	3.3	20
APR											
14...	11	3.9	5	.1	1.1	.80	180	0	150	1.8	19
MAY											
06...	13	5.2	5	.2	1.1	.80	200	0	170	2.6	15
JUN											
09...	15	6.2	6	.2	.9	.70	220	0	180	3.5	10
JUL											
08...	14	4.7	6	.2	.6	.40	200	0	160	2.5	8.6
AUG											
06...	14	5.5	7	.2	.4	.30	180	0	150	7.4	12
SEP											
15...	14	5.7	7	.2	.5	--	200	0	160	4.9	9.3

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 09...	5.6	.2	10	211	193	20.5	.02	.01	.030	.010	.04
NOV 05...	4.8	.2	12	228	212	536	.01	.01	.030	.030	.04
DEC 10...	6.5	.2	10	232	215	539	.07	.07	.030	.030	.04
JAN 07...	6.5	.2	12	251	238	586	.20	.09	.050	.040	.06
FEB 18...	6.0	.2	12	249	240	309	.11	.11	.080	.070	.09
MAR 25...	5.2	.2	8.8	211	207	282	.18	.15	.100	.100	--
APR 14...	6.3	.2	5.3	217	185	855	.09	.09	.060	.050	--
MAY 06...	6.4	.2	4.9	231	205	534	.04	.04	.050	.050	--
JUN 09...	5.9	.2	6.4	223	207	511	.04	.02	.050	.050	--
JUL 08...	4.6	.2	8.8	203	184	28.0	.02	.02	.030	.030	--
AUG 06...	5.5	.2	9.9	201	181	24.4	.03	.03	.040	.020	--
SEP 15...	5.6	.2	9.8	213	185	684	--	.12	.040	.040	--

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUS-PENDED (MG/L)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 09...	.24	.27	.29	1.3	.020	.06	.010	--	3	.29	100
NOV 05...	.10	.13	.14	.60	.020	.06	.010	6.3	--	--	--
DEC 10...	.20	.23	.30	1.3	.010	.03	.000	--	4	9.3	100
JAN 07...	.21	.26	.46	2.0	.020	.06	.000	--	3	7.0	100
FEB 18...	.22	.30	.41	1.8	.010	.03	.010	5.7	2	2.5	100
MAR 25...	.03	.13	.31	1.4	.020	.06	.010	--	2	2.7	100
APR 14...	.53	.59	.68	3.0	.020	.06	.010	15	5	20	100
MAY 06...	.41	.46	.50	2.2	.020	.06	<.010	14	4	9.2	100
JUN 09...	.43	.48	.52	2.3	.020	.06	<.010	--	--	--	--
JUL 08...	.55	.58	.60	2.7	.020	.06	<.010	12	7	.96	100
AUG 06...	.16	.20	.23	1.0	.030	.09	<.010	9.9	3	.36	100
SEP 15...	.48	.52	--	--	.020	.06	.010	--	4	13	100

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT											
08...	0730	3	3	100	30	1	1	20	18	0	0
DEC											
10...	1000	1	1	<50	40	2	2	30	10	2	0
MAR											
25...	0930	0	0	100	0	0	0	10	<10	0	0
JUN											
09...	0945	0	0	100	20	1	1	20	10	1	0
SEP											
15...	1200	2	2	<50	<50	1	1	20	10	1	<1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT										
08...	4	1	160	0	0	0	20	1	.2	.1
DEC										
10...	4	1	150	10	3	0	20	8	.4	.4
MAR										
25...	1	1	180	30	11	0	10	10	.2	.2
JUN										
09...	2	1	260	10	5	0	40	3	.1	<.1
SEP										
15...	10	2	140	30	4	3	20	10	.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT										
08...	1	0	0	0	0	0	10	6	7.6	.4
DEC										
10...	5	3	0	0	0	0	30	0	14	.5
MAR										
25...	2	1	0	0	0	0	50	30	7.8	.3
JUN										
09...	4	1	0	0	0	0	70	20	16	.4
SEP										
15...	4	2	<1	<1	<1	<1	40	10	6.3	.4

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 5,80
TIME	0900
TOTAL CELLS/ML	740
DIVERSITY: DIVISION	1.1
.CLASS	1.1
..ORDER	1.3
...FAMILY	1.4
....GENUS	2.6

ORGANISM	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...OOCYSTACEAE		
....ANKISTRODESMUS	26	4
...SCENEDESMACEAE		
....CRUCIGENIA	100	14
....SCENEDESMUS	100	14
CHRYSOPHYTA		
.BACILLARIOPHYCEAE		
..CENTRALES		
...COSCINODISCACEAE		
....CYCLOTELLA	13	2
..PENNALES		
...FRAGILARIACEAE		
....ASTERIONELLA	140#	19
....FRAGILARIA	230#	32
....SYNEDRA	91	12
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROOCOCCALES		
...CHROOCOCCACEAE		
....ANACYSTIS	13	2
PYRRHOPHYTA (FIRE ALGAE)		
.DINOPHYCEAE		
..DINOKONTAE		
...GLENODINIACEAE		
....GLENODINIUM	13	2

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 25,81		MAY 6,81		JUN 9,81		JUL 8,81		AUG 6,81		SEP 15,81	
TIME	0930		1000		0945		0800		0845		1200	
TOTAL CELLS/ML	78		810		8200		2100		15000		640	
DIVERSITY: DIVISION	1.0		1.8		1.5		1.6		1.8		0.9	
.CLASS	1.0		1.8		1.5		1.7		2.1		0.9	
..ORDER	1.5		2.4		1.7		1.8		2.3		0.9	
...FAMILY	1.8		2.7		2.1		2.1		2.6		0.9	
....GENUS	1.8		2.8		2.2		2.3		2.7		0.9	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHLOROCOCCACEAE												
....TETRAEDRON	--	-	--	-	*	0	--	-	*	0	--	-
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	--	-	--	-	26	1	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	13	2	140	2	39	2	210	1	--	-
....KIRCHNERIELLA	--	-	--	-	210	3	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	52	2	1100	7	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	140	1	--	-
...SCENEDESMACEAE												
....COELASTRUM	--	-	--	-	--	-	130	6	--	-	--	-
....CRUCIGENIA	--	-	--	-	3900#	48	52	2	--	-	--	-
....SCENEDESMUS	--	-	180#	22	70	1	26	1	980	6	440#	68
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	39#	50	26	3	140	2	26	1	700	5	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....STAURASTRUM	--	-	--	-	--	-	--	-	*	0	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	13#	17	39	5	2400#	30	39	2	700	5	--	-
....STEPHANODISCUS	--	-	64	8	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	13	2	--	-	--	-	*	0	--	-
...DIATOMACEAE												
....DIATOMA	13#	17	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....SYNEDRA	--	-	51	6	70	1	64	3	210	1	--	-
...NAVICULACEAE												
....NAVICULA	13#	17	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	--	-	51	6	110	1	26	1	140	1	200#	32
.CHRYSOPHYCEAE												
..OCHROMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	--	-	2700#	17	--	-
...SYNURACEAE												
....MALLOMONAS	--	-	--	-	--	-	13	1	*	0	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	51	6	530	6	77	4	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	140	2	180	8	420	3	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	--	-	39	5	390	5	1300#	63	7300#	47	--	-
..OSCILLATORIALES												
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	280#	35	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	13	1	*	0	--	-
....TRACHELOMONAS	--	-	--	-	--	-	13	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..DINOKONTAE												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	26	1	--	-	--	-
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	630	4	--	-

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	---	---	---	364	347	357	448	415	424
2	---	---	---	380	377	379	365	355	356	450	419	424
3	---	---	---	---	---	---	399	353	378	441	406	423
4	---	---	---	388	367	373	413	374	384	454	409	425
5	---	---	---	377	370	372	408	380	387	451	416	423
6	---	---	---	382	369	373	385	382	384	461	419	427
7	---	---	---	377	369	372	386	384	385	---	---	---
8	---	---	---	402	360	374	388	385	387	---	---	---
9	370	356	362	362	359	361	389	385	387	---	---	---
10	374	357	362	364	359	360	391	388	389	---	---	---
11	---	---	---	368	359	362	394	390	392	---	---	---
12	---	---	---	383	345	363	395	391	393	---	---	---
13	---	---	---	364	348	353	403	388	396	---	---	---
14	372	362	365	350	348	349	422	396	404	---	---	---
15	374	363	367	354	349	351	403	396	398	---	---	---
16	376	365	368	---	---	---	411	398	401	---	---	---
17	384	365	370	369	358	361	404	399	401	---	---	---
18	380	368	374	364	352	359	411	403	406	---	---	---
19	---	---	---	355	352	353	431	406	411	---	---	---
20	375	369	374	355	353	354	418	406	409	---	---	---
21	---	---	---	388	354	360	464	408	423	---	---	---
22	---	---	---	399	350	378	414	408	409	---	---	---
23	388	375	380	395	360	374	427	411	415	---	---	---
24	379	373	376	366	351	354	413	412	412	---	---	---
25	387	369	377	355	353	354	414	412	413	---	---	---
26	---	---	---	354	352	353	431	413	414	---	---	---
27	---	---	---	354	353	354	465	406	425	---	---	---
28	392	378	384	354	352	353	457	380	425	---	---	---
29	400	379	387	354	353	353	459	411	432	---	---	---
30	394	375	382	361	353	354	457	422	430	---	---	---
31	385	348	377	---	---	---	455	416	429	---	---	---
MONTH							465	347	401			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	348	345	347	330	318	323	328	325	327
2	---	---	---	348	345	347	325	315	320	329	325	327
3	---	---	---	349	346	347	317	309	313	330	327	329
4	---	---	---	348	345	347	313	310	312	339	329	332
5	---	---	---	351	348	349	310	308	309	333	331	332
6	---	---	---	354	351	352	312	307	310	337	332	335
7	---	---	---	356	352	354	308	306	307	343	325	337
8	---	---	---	360	356	358	308	306	307	341	319	338
9	---	---	---	361	357	359	307	304	306	357	332	344
10	---	---	---	360	356	359	310	305	307	347	327	337
11	---	---	---	363	359	361	309	304	307	350	330	341
12	---	---	---	363	360	361	305	303	305	355	338	348
13	---	---	---	362	360	361	311	305	309	362	355	359
14	---	---	---	362	359	360	315	306	311	362	337	347
15	---	---	---	375	346	359	317	312	314	354	347	352
16	---	---	---	363	359	360	314	306	312	348	337	343
17	---	---	---	378	360	364	321	315	319	360	346	352
18	---	---	---	419	362	374	324	317	320	370	361	367
19	422	413	418	385	359	367	331	318	325	364	343	352
20	413	403	409	405	345	364	322	313	317	366	344	354
21	403	361	382	369	345	354	319	316	318	362	347	355
22	359	339	346	402	351	369	319	317	318	370	353	364
23	338	335	336	352	350	351	320	312	318	368	352	357
24	342	336	340	383	348	355	321	317	319	360	350	356
25	344	342	343	362	346	350	325	322	323	382	345	364
26	345	342	344	379	345	351	323	320	322	372	356	365
27	346	343	344	352	345	347	323	321	322	372	355	363
28	346	343	345	350	342	345	325	322	324	369	360	366
29	---	---	---	353	336	343	326	323	324	377	357	363
30	---	---	---	337	327	332	329	326	328	370	347	358
31	---	---	---	331	323	328	---	---	---	370	346	353
MONTH				419	323	354	331	303	316	382	319	349

04135000 THUNDER BAY RIVER NEAR ALPENA, MI

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	368	348	360	316	307	313	313	284	301	257	249	253
2	368	361	365	320	309	314	309	271	292	254	249	251
3	376	368	371	338	313	324	326	304	313	251	248	250
4	376	365	368	338	316	325	318	310	314	253	248	250
5	378	370	374	336	309	324	329	288	310	289	247	264
6	378	354	366	325	297	307	331	302	311	292	275	284
7	361	350	354	318	294	304	308	297	303	291	284	287
8	368	352	361	308	272	289	304	285	296	298	279	285
9	367	337	355	303	277	286	297	279	291	293	284	286
10	361	340	351	346	275	304	297	292	294	295	283	287
11	350	336	341	340	309	319	297	288	292	289	282	285
12	344	330	338	325	269	305	292	285	289	295	283	287
13	345	332	336	317	285	301	302	291	297	290	277	283
14	342	322	334	309	295	299	300	285	290	296	283	287
15	356	342	350	315	292	299	295	274	281	307	279	291
16	368	356	362	304	287	296	282	270	276	306	293	298
17	369	350	358	303	291	298	276	270	274	320	293	303
18	359	328	340	300	283	294	288	272	278	327	286	303
19	345	340	342	299	276	292	280	268	275	310	302	306
20	342	323	334	303	296	299	280	276	278	317	301	312
21	340	310	318	317	292	299	281	278	279	326	317	320
22	332	294	306	308	300	303	281	273	277	322	316	319
23	306	283	293	302	296	298	282	273	278	325	316	320
24	306	265	283	304	292	295	282	275	278	326	313	318
25	321	294	307	297	282	290	276	273	275	328	318	322
26	322	301	310	311	290	295	276	272	273	329	310	320
27	329	307	315	304	281	295	276	253	270	327	314	319
28	328	312	317	312	298	303	267	257	260	323	315	319
29	327	312	318	312	295	301	264	244	256	328	317	320
30	324	310	315	301	296	300	275	229	254	326	320	322
31	---	---	---	308	293	301	258	248	253	---	---	---
MONTH	378	265	338	346	269	302	331	229	284	329	247	295

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	---	---	---	1.0	.0	.5	.0	.0	.0
2	---	---	---	4.5	4.0	4.5	1.0	.0	.5	.0	.0	.0
3	---	---	---	---	---	---	.5	.0	.0	.0	.0	.0
4	---	---	---	6.0	3.0	5.0	.0	.0	.0	.0	.0	.0
5	---	---	---	5.0	1.0	4.0	.0	.0	.0	.0	.0	.0
6	---	---	---	5.5	3.0	4.0	1.5	.0	.5	.0	.0	.0
7	---	---	---	5.5	2.5	4.0	.5	.5	.5	.0	.0	.0
8	---	---	---	6.0	.0	3.0	.5	.5	.5	---	---	---
9	10.5	3.5	8.5	5.0	4.0	4.5	.5	.0	.5	---	---	---
10	10.0	5.0	8.5	4.5	2.0	4.0	.5	.0	.0	---	---	---
11	---	---	---	3.0	.0	2.0	.0	.0	.0	---	---	---
12	---	---	---	2.5	.0	1.5	.0	.0	.0	---	---	---
13	---	---	---	2.5	2.0	2.0	1.5	.0	.5	---	---	---
14	9.0	4.5	8.0	2.0	2.0	2.0	.0	.0	.0	---	---	---
15	8.5	6.5	7.5	2.0	.0	2.0	.5	.0	.0	---	---	---
16	9.0	6.0	7.5	---	---	---	.0	.0	.0	---	---	---
17	10.0	8.0	9.0	2.0	.0	1.5	.0	.0	.0	---	---	---
18	8.5	7.0	8.0	2.0	.5	1.5	.5	.0	.0	---	---	---
19	---	---	---	2.0	1.5	2.0	.0	.0	.0	---	---	---
20	9.0	6.0	8.0	2.0	1.5	1.5	.0	.0	.0	---	---	---
21	---	---	---	2.0	1.5	2.0	.0	.0	.0	---	---	---
22	---	---	---	2.0	1.5	1.5	.0	.0	.0	---	---	---
23	---	---	---	2.5	1.5	2.0	.5	.0	.0	---	---	---
24	7.5	5.5	6.5	2.5	1.5	1.5	.0	.0	.0	---	---	---
25	9.5	4.0	7.5	1.5	1.0	1.5	.0	.0	.0	---	---	---
26	---	---	---	1.5	1.0	1.5	.0	.0	.0	---	---	---
27	---	---	---	1.5	1.0	1.0	.0	.0	.0	---	---	---
28	---	---	---	1.0	1.0	1.0	.0	.0	.0	---	---	---
29	6.0	2.5	4.0	1.0	1.0	1.0	.0	.0	.0	---	---	---
30	---	---	---	---	---	---	.0	.0	.0	---	---	---
31	5.0	1.5	4.0	---	---	---	.0	.0	.0	---	---	---
MONTH							1.5	.0	.0			

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	.0	.0	.0	4.5	3.5	4.0	11.5	10.5	11.0
2	---	---	---	.0	.0	.0	5.0	3.5	4.0	12.0	11.0	11.5
3	---	---	---	.0	.0	.0	7.0	5.5	6.5	12.0	11.0	11.5
4	---	---	---	.0	.0	.0	9.5	7.0	8.5	12.5	9.5	11.5
5	---	---	---	.0	.0	.0	9.0	8.0	8.5	13.0	11.0	13.0
6	---	---	---	.0	.0	.0	8.0	7.5	7.5	13.5	6.5	11.5
7	---	---	---	.0	.0	.0	8.5	7.0	8.0	13.5	6.0	11.0
8	---	---	---	.0	.0	.0	8.0	8.0	8.0	13.5	6.0	11.5
9	---	---	---	.5	.0	.0	9.0	8.0	8.5	18.0	8.5	13.0
10	---	---	---	.0	.0	.0	9.5	8.5	9.0	12.5	7.0	9.0
11	---	---	---	.0	.0	.0	10.5	9.5	10.0	12.5	7.0	10.5
12	---	---	---	.5	.0	.0	10.5	10.0	10.5	11.5	8.0	11.0
13	---	---	---	.5	.0	.0	10.5	10.0	10.5	11.5	10.5	10.5
14	---	---	---	.5	.0	.0	10.5	9.5	10.0	11.0	6.5	10.0
15	---	---	---	4.5	.0	1.0	9.5	8.5	9.0	10.5	10.0	10.5
16	---	---	---	.5	.0	.5	10.0	8.5	9.0	14.0	7.0	10.5
17	---	---	---	.5	.0	.0	10.0	9.0	9.5	12.5	5.5	10.5
18	.0	.0	.0	.5	.0	.0	10.5	9.5	10.0	13.0	11.5	12.0
19	.0	.0	.0	.5	.0	.0	10.0	5.0	9.0	14.0	6.0	11.5
20	.0	.0	.0	.5	.0	.0	9.5	1.5	7.0	14.5	7.5	12.5
21	.0	.0	.0	---	---	---	9.0	8.5	8.5	16.0	9.0	13.5
22	.0	.0	.0	1.0	.0	.5	8.5	6.5	8.0	17.0	10.0	14.5
23	.0	.0	.0	1.0	.0	.5	8.0	6.0	7.5	20.5	12.5	15.5
24	.0	.0	.0	1.0	.0	.5	8.0	7.5	7.5	19.0	13.5	16.0
25	.0	.0	.0	1.5	.0	.5	8.0	7.0	7.5	23.0	15.0	18.0
26	.0	.0	.0	1.5	.0	1.0	8.0	7.5	8.0	18.0	13.5	16.5
27	.0	.0	.0	2.5	1.5	2.0	9.0	8.0	8.5	18.5	14.5	17.0
28	.0	.0	.0	5.5	2.0	3.0	9.0	9.0	9.0	19.0	12.0	16.0
29	---	---	---	5.0	3.0	3.5	10.0	9.0	9.5	19.0	15.0	17.5
30	---	---	---	3.5	3.5	3.5	11.0	9.5	10.0	20.5	11.5	17.0
31	---	---	---	4.0	4.0	4.0	---	---	---	19.0	9.0	14.5
MONTH							11.0	1.5	8.5	23.0	5.5	13.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.5	10.5	17.0	21.0	17.0	19.5	25.5	18.5	21.5	22.5	20.5	21.5
2	18.5	12.0	16.0	21.5	18.5	20.5	26.0	19.0	22.0	22.0	17.5	20.5
3	19.0	15.5	17.5	22.5	19.0	21.0	23.5	20.5	22.5	21.5	17.5	20.5
4	19.5	15.5	18.0	27.0	19.5	22.5	23.5	21.0	22.5	21.5	21.0	21.0
5	20.5	14.5	18.0	27.5	19.5	22.5	24.0	20.0	22.0	22.0	18.5	20.0
6	24.5	14.5	19.0	24.0	19.0	22.0	24.0	19.5	22.0	21.5	18.5	19.5
7	21.0	11.5	16.5	25.0	19.5	23.0	24.0	21.0	22.5	20.5	18.0	19.5
8	20.5	15.5	18.5	26.0	21.5	24.0	25.5	20.0	22.5	20.5	19.5	20.0
9	20.5	15.0	18.5	26.5	22.0	25.0	27.5	19.5	23.0	19.5	14.0	18.0
10	20.0	15.5	18.0	26.5	19.0	24.0	23.5	20.0	22.0	19.5	16.0	18.0
11	20.5	13.5	17.5	31.0	20.5	25.0	23.5	20.0	22.0	19.5	16.0	18.0
12	20.5	16.5	19.0	31.0	21.5	25.5	23.5	19.5	22.0	20.0	17.5	19.5
13	20.0	15.5	18.0	26.5	22.0	24.5	23.0	20.0	21.5	26.0	15.5	19.5
14	26.5	17.5	21.0	25.5	20.5	23.5	23.0	20.0	22.0	20.5	17.0	19.0
15	22.0	19.0	20.5	25.5	20.5	23.5	26.5	19.5	22.5	20.0	16.0	18.5
16	22.0	21.5	22.0	25.0	21.5	23.5	26.0	18.5	21.5	19.0	15.5	17.5
17	22.0	21.5	22.0	25.0	21.5	23.5	22.5	17.5	20.0	18.0	15.0	17.0
18	22.0	18.0	20.5	29.5	21.5	24.5	22.5	17.0	20.0	17.5	13.5	16.0
19	22.0	21.5	22.0	28.0	21.5	24.0	22.0	17.5	19.5	21.0	12.0	15.5
20	22.0	20.5	21.0	24.5	22.0	23.5	22.0	17.0	19.5	20.0	12.0	14.5
21	20.5	19.0	20.5	24.0	19.5	22.5	22.0	17.5	20.0	15.5	11.0	14.0
22	20.0	16.0	18.5	24.0	19.0	22.0	25.0	18.5	21.0	14.5	11.0	13.0
23	19.5	14.5	18.0	23.5	18.5	21.5	27.5	18.5	22.0	14.0	9.5	12.5
24	20.0	17.0	19.0	23.5	19.0	21.5	22.5	19.0	20.5	14.0	9.5	12.5
25	19.5	16.0	18.5	27.5	19.0	22.5	22.5	18.0	20.5	13.5	13.0	13.5
26	20.0	12.5	17.0	23.0	19.0	21.5	22.5	18.0	20.5	15.0	13.0	13.5
27	25.5	16.0	20.0	22.5	16.5	20.0	22.5	20.0	21.0	17.5	11.0	14.0
28	20.0	15.0	18.0	21.5	18.5	20.5	22.0	20.5	21.5	13.0	7.5	11.5
29	20.5	17.5	19.5	22.0	17.0	20.0	25.0	20.0	21.5	12.5	9.5	11.5
30	21.0	17.5	20.0	22.0	16.0	20.0	25.0	20.0	22.0	12.0	8.5	10.5
31	---	---	---	22.0	17.0	20.5	22.5	20.0	21.5	---	---	---
MONTH	26.5	10.5	19.0	31.0	14.0	22.5	27.5	17.0	21.5	26.0	7.5	16.5

04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE¼ SE¼ sec.7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft (20 m) upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi (1.1 km) upstream from East Branch, and 114 mi (183 km) upstream from mouth.

DRAINAGE AREA.--110 mi² (285 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft (342.440 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 8 to Feb. 20, which are poor. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi (4.0 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 74.5 ft³/s (2.110 m³/s), 9.20 in/yr (234 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft³/s (7.76 m³/s) June 2, 1943, gage height, 3.00 ft (0.914 m); minimum, 28 ft³/s (0.79 m³/s) Apr. 21, 1946, gage height, 0.80 ft (0.244 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 120 ft³/s (3.40 m³/s) Apr. 29, 30, gage height, 1.80 ft (0.549 m); minimum, 46 ft³/s (1.30 m³/s) Sept. 24, 25; minimum gage height, 1.08 ft (0.329 m) Dec. 3, Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	63	59	56	56	101	111	100	62	58	49	63
2	60	62	59	56	56	94	105	88	62	56	48	59
3	64	61	49	56	56	84	98	81	64	55	49	59
4	66	62	59	55	56	80	97	77	65	60	54	57
5	64	63	63	56	56	77	94	76	64	70	56	55
6	62	63	62	58	55	74	88	76	62	63	54	53
7	61	63	66	58	53	73	82	76	60	59	55	52
8	60	62	76	57	53	72	80	74	60	56	58	55
9	59	62	81	57	54	71	96	72	60	54	58	57
10	58	62	77	57	54	71	109	72	60	53	58	55
11	59	62	63	57	53	71	106	75	61	54	54	52
12	60	62	62	57	53	71	96	74	60	54	53	50
13	61	62	67	57	53	71	86	71	60	53	52	49
14	62	65	65	57	52	70	82	69	60	51	53	48
15	62	66	63	57	54	70	80	68	60	50	58	49
16	61	65	62	58	57	71	79	67	67	50	59	49
17	62	63	58	58	62	71	77	66	77	50	57	49
18	61	62	56	57	68	70	76	65	71	55	53	49
19	62	62	60	57	80	70	74	65	64	58	51	48
20	64	61	59	57	94	69	72	64	61	61	50	47
21	66	61	59	57	93	68	71	63	61	64	49	47
22	66	61	58	57	84	68	70	62	65	59	49	47
23	64	61	58	57	85	69	74	62	67	55	49	47
24	62	61	58	57	91	70	79	66	65	53	48	46
25	63	62	57	58	90	73	81	75	62	52	47	47
26	64	60	57	58	83	75	78	73	59	51	47	47
27	66	59	57	58	80	78	75	69	57	50	49	47
28	65	60	57	58	94	82	96	67	56	51	51	48
29	65	60	56	57	---	91	117	65	56	53	53	48
30	65	60	56	57	---	107	115	63	57	53	60	47
31	64	---	56	56	---	113	---	62	---	50	69	---
TOTAL	1938	1858	1895	1768	1875	2395	2644	2203	1865	1711	1650	1526
MEAN	62.5	61.9	61.1	57.0	67.0	77.3	88.1	71.1	62.2	55.2	53.2	50.9
MAX	66	66	81	58	94	113	117	100	77	70	69	63
MIN	58	59	49	55	52	68	70	62	56	50	47	46
CFSM	.57	.56	.56	.52	.61	.70	.80	.65	.57	.50	.48	.46
IN.	.66	.63	.64	.60	.63	.81	.89	.75	.63	.58	.56	.52

CAL YR 1980 TOTAL 26158 MEAN 71.5 MAX 176 MIN 49 CFSM .65 IN 8.85
WTR YR 1981 TOTAL 23328 MEAN 63.9 MAX 117 MIN 46 CFSM .58 IN 7.89

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW¼ NW¼ sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank, at south boundary of Michigan Department of Natural Resources field office in Grayling (revised) and 0.4 mi (0.6 km) upstream from mouth.

DRAINAGE AREA.--76.0 mi^2 (196.8 km^2).

PERIOD OF RECORD.--April 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft (338 m), from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft (3 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Michigan Department of Natural Resources ponds above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 44.2 ft^3/s (1.252 m^3/s), 7.90 in/yr (201 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft^3/s (5.86 m^3/s) Mar. 28, 1976, gage height, 5.24 ft (1.597 m); minimum, 7.0 ft^3/s (0.20 m^3/s) Mar. 27, 1965, result of freezeup; minimum daily, 16 ft^3/s (0.45 m^3/s) Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 76 ft^3/s (2.15 m^3/s) Apr. 29, gage height, 3.76 ft (1.146 m); minimum, 21 ft^3/s (0.59 m^3/s) Dec. 2, 3, Sept. 15; minimum gage height, 2.87 ft (0.875 m) Sept. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	33	32	28	27	58	65	59	36	30	22	26
2	35	33	26	28	27	54	62	56	36	29	22	26
3	38	32	26	28	27	51	60	54	37	29	23	25
4	48	33	29	28	27	50	62	51	37	30	25	25
5	40	33	30	28	27	49	60	51	36	36	25	25
6	36	34	31	28	26	48	57	50	35	32	24	24
7	35	33	36	28	26	47	54	48	35	29	26	24
8	35	33	41	28	26	46	56	47	35	27	32	28
9	34	33	40	28	26	46	69	45	34	27	32	27
10	33	33	36	28	26	46	64	46	36	25	29	26
11	33	32	28	28	26	45	59	48	36	25	27	25
12	39	30	34	28	26	45	55	46	35	25	25	24
13	37	32	34	28	25	46	53	44	35	25	24	23
14	36	36	32	28	25	44	55	42	34	24	25	22
15	36	34	31	28	26	45	52	42	35	24	30	22
16	35	33	31	28	28	45	49	42	41	23	28	22
17	36	32	29	28	30	45	59	41	42	25	27	23
18	36	32	29	28	33	44	53	40	37	27	25	23
19	36	33	29	28	41	43	50	39	35	24	24	23
20	36	34	30	28	47	43	48	39	33	26	23	22
21	36	34	29	28	47	42	47	41	34	27	23	22
22	35	34	29	28	47	43	46	39	38	25	22	23
23	35	34	29	28	51	43	50	38	36	24	23	23
24	34	35	29	28	52	45	51	44	34	24	22	22
25	34	34	28	28	50	46	49	51	33	23	22	23
26	36	32	28	28	48	48	47	46	31	23	22	25
27	37	32	28	28	49	48	46	43	30	24	26	26
28	35	33	28	26	63	51	64	41	30	23	30	26
29	34	33	28	28	---	59	73	39	30	24	29	25
30	33	33	28	28	---	66	65	38	30	24	28	25
31	34	---	28	28	---	66	---	37	---	23	26	---
TOTAL	1111	992	948	866	979	1497	1680	1387	1046	806	791	725
MEAN	35.8	33.1	30.6	27.9	35.0	48.3	56.0	44.7	34.9	26.0	25.5	24.2
MAX	48	36	41	28	63	66	73	59	42	36	32	28
MIN	33	30	26	26	25	42	46	37	30	23	22	22
CFSM	.47	.44	.40	.37	.46	.64	.74	.59	.46	.34	.34	.32
IN.	.54	.49	.46	.42	.48	.73	.82	.68	.51	.39	.39	.35

CAL YR 1980 TOTAL 14605 MEAN 39.9 MAX 100 MIN 26 CFSM .53 IN 7.15
WTR YR 1981 TOTAL 12828 MEAN 35.1 MAX 73 MIN 22 CFSM .46 IN 6.28

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE¼ SE¼ sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft (3 m) upstream from Smith Bridge, 400 ft (122 m) downstream from bridge on State Highway 72, 4.6 mi (7.4 km) upstream from mouth, and 9.1 mi (14.6 km) west of Luzerne.

DRAINAGE AREA.--401 mi² (1,039 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft (326 m), from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--15 years, 221 ft³/s (6.259 m³/s), 7.48 in/yr (190 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Mar. 28, 1976, gage height, 7.30 ft (2.225 m); minimum, 78 ft³/s (2.21 m³/s) Feb. 12, 1981, gage height, 3.98 ft (1.213 m), result of freeze up.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 494 ft³/s (14.0 m³/s) Apr. 30, gage height, 5.64 ft (1.719 m); maximum gage height, 6.59 ft (2.009 m) Dec. 25, backwater from ice; minimum discharge, 78 ft³/s (2.21 m³/s) Feb. 12, gage height, 3.98 ft (1.213 m), result of freeze up.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	201	195	181	165	145	325	318	485	199	142	125	155
2	197	190	181	162	142	304	310	441	192	133	123	152
3	205	188	152	166	140	281	295	403	194	131	123	147
4	213	194	172	165	140	278	288	373	198	132	126	144
5	218	195	179	165	140	262	276	354	201	127	135	138
6	223	195	183	167	140	248	258	336	195	124	131	136
7	224	195	195	165	140	235	247	320	182	117	134	140
8	221	194	222	165	135	232	242	309	177	113	146	137
9	215	196	235	165	135	229	319	296	172	113	157	136
10	212	196	237	160	135	230	326	294	170	113	146	137
11	209	194	212	160	128	230	323	316	165	108	146	134
12	207	188	202	155	123	228	316	321	160	107	139	130
13	204	185	190	155	135	236	303	324	158	107	132	138
14	203	204	190	155	142	230	318	321	159	105	130	138
15	205	211	190	155	144	231	321	311	160	102	142	140
16	205	215	188	155	145	229	316	298	166	101	142	144
17	211	212	182	153	154	227	337	287	161	113	137	148
18	217	206	175	151	171	219	339	278	151	164	133	147
19	215	198	172	151	207	209	325	268	152	176	130	144
20	215	193	170	152	235	203	322	259	147	192	130	138
21	213	191	170	152	248	202	314	251	139	173	125	136
22	211	191	170	152	268	203	311	244	154	150	122	136
23	207	190	170	152	315	206	323	239	162	134	120	137
24	204	191	166	152	342	213	340	242	148	124	118	133
25	205	190	165	153	339	219	342	284	137	119	117	133
26	208	185	165	152	328	227	342	265	130	124	116	141
27	214	179	165	152	305	232	337	253	126	131	119	146
28	216	183	165	151	339	243	400	245	123	133	126	144
29	212	183	165	150	---	258	473	234	122	136	148	145
30	206	181	163	150	---	293	487	221	130	134	151	143
31	200	---	164	150	---	319	---	207	---	128	159	---
TOTAL	6516	5808	5636	4853	5460	7481	9767	9279	4830	4006	4128	4217
MEAN	210	194	182	157	195	241	326	299	161	129	133	141
MAX	224	215	237	167	342	325	487	485	201	192	159	155
MIN	197	179	152	150	123	202	242	207	122	101	116	130
CFSM	.52	.48	.45	.39	.49	.60	.81	.75	.40	.32	.33	.35
IN.	.60	.54	.52	.45	.51	.69	.91	.86	.45	.37	.38	.39

CAL YR 1980 TOTAL 71541 MEAN 195 MAX 412 MIN 118 CFSM .49 IN 6.64
WTR YR 1981 TOTAL 71981 MEAN 197 MAX 487 MIN 101 CFSM .49 IN 6.68

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Mar. 24 to May 13 (range in temperature 2.5 to 15.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C July 16, 1968, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 23.5°C July 9; minimum 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	11.0	5.0	4.5	2.0	1.5	.0	.0	.0	.0	.5	.5
2	12.0	11.0	5.0	4.5	2.0	.5	.0	.0	.0	.0	.5	.0
3	11.5	9.5	6.0	5.0	.5	.5	.0	.0	.0	.0	1.0	.0
4	9.5	8.5	6.0	6.0	.5	.5	.0	.0	.0	.0	1.0	.5
5	8.0	7.5	6.0	5.0	.5	.0	.0	.0	.0	.0	1.0	.5
6	7.5	7.0	5.5	5.0	1.0	.0	.0	.0	.0	.0	1.0	.5
7	8.0	7.0	5.5	5.0	1.5	1.0	.0	.0	.0	.0	1.5	.5
8	9.5	8.0	5.0	4.0	1.5	1.5	.0	.0	.0	.0	2.0	1.5
9	9.0	7.5	5.0	4.0	1.5	1.0	.0	.0	.5	.0	2.5	2.0
10	9.0	7.5	5.0	4.0	1.0	.0	.0	.0	.0	.0	2.5	2.0
11	8.5	8.0	4.0	3.5	.0	.0	.0	.0	.0	.0	2.5	1.5
12	8.0	7.5	3.5	2.5	.0	.0	.0	.0	.5	.0	2.5	1.0
13	8.0	7.0	4.0	3.0	.0	.0	.0	.0	.0	.0	2.5	1.5
14	7.0	6.0	4.0	4.0	.0	.0	.0	.0	.0	.0	2.0	.5
15	6.0	6.0	4.0	3.5	.0	.0	.0	.0	1.5	.0	2.5	1.5
16	6.5	6.0	3.5	2.5	.0	.0	.0	.0	2.5	1.5	2.0	.5
17	8.5	6.5	3.0	2.5	.0	.0	.0	.0	3.0	1.5	1.5	.5
18	8.5	8.0	2.5	2.5	.0	.0	.0	.0	2.5	2.0	1.5	.5
19	8.0	7.5	2.5	1.5	.0	.0	.0	.0	2.5	2.0	1.0	.5
20	8.0	7.5	2.5	2.0	.0	.0	.5	.0	2.0	1.0	1.5	1.0
21	7.5	7.0	3.0	2.5	.0	.0	.0	.0	2.0	1.5	3.0	1.5
22	7.0	7.0	3.0	2.5	.0	.0	.0	.0	2.0	1.5	3.0	1.5
23	7.0	6.0	3.0	2.5	.0	.0	.0	.0	1.5	1.5	4.0	2.0
24	7.5	6.5	3.0	3.0	.0	.0	.0	.0	1.5	.5	---	---
25	7.5	7.5	3.0	2.5	.0	.0	.0	.0	.5	.5	---	---
26	7.5	6.0	2.0	1.0	.0	.0	.0	.0	.5	.0	---	---
27	6.0	5.0	1.5	1.5	.0	.0	.0	.0	1.0	.0	---	---
28	5.5	4.5	2.0	1.5	.0	.0	.0	.0	1.0	.5	---	---
29	5.0	4.5	2.0	2.0	.0	.0	.0	.0	---	---	---	---
30	4.5	4.0	2.0	2.0	.0	.0	.0	.0	---	---	---	---
31	5.0	4.0	---	---	.0	.0	.0	.0	---	---	---	---
MONTH	12.0	4.0	6.0	1.0	2.0	.0	.5	.0	3.0	.0		

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1			---	---	18.0	14.0	20.5	16.5	20.5	16.0	17.5	16.0
2			---	---	17.5	14.0	20.5	18.0	20.0	16.5	17.0	15.0
3			---	---	18.0	16.0	21.0	16.5	19.0	16.5	17.0	14.5
4			---	---	18.0	16.0	20.5	17.5	19.0	17.0	17.0	15.0
5			---	---	19.0	15.5	22.0	17.5	19.5	16.5	16.0	14.5
6			---	---	19.5	16.5	22.5	17.5	19.5	16.5	15.5	14.5
7			---	---	19.5	15.0	22.5	18.0	17.5	16.0	15.0	13.5
8			---	---	19.0	16.5	22.5	18.5	18.0	16.0	15.5	13.5
9			---	---	18.0	15.0	23.5	20.0	19.0	15.5	14.5	11.0
10			---	---	18.5	16.0	21.5	17.0	19.0	16.5	17.0	13.0
11			---	---	19.5	15.5	20.5	16.5	18.5	15.5	17.5	13.5
12			---	---	19.5	16.5	19.5	17.0	17.5	14.0	17.5	14.5
13			---	---	18.0	16.5	22.0	17.5	17.5	15.0	16.0	12.5
14			12.0	10.5	21.5	16.0	21.0	17.0	17.5	16.5	16.0	13.5
15			11.0	10.5	23.0	19.0	19.5	15.5	17.0	16.0	14.5	12.0
16			12.5	9.5	22.5	18.5	17.5	15.5	18.0	14.0	12.5	10.5
17			13.5	10.5	20.5	16.0	17.5	15.5	17.5	13.0	11.0	10.0
18			14.0	10.5	20.0	16.5	20.0	16.0	17.5	13.0	11.5	9.5
19			15.0	11.0	19.5	16.0	20.0	18.0	18.0	13.0	13.0	10.0
20			16.0	11.5	19.0	16.0	19.0	18.0	17.5	13.5	12.0	10.0
21			17.0	12.5	18.0	15.5	19.0	17.0	17.0	13.0	11.0	9.0
22			18.0	13.5	18.0	15.5	18.0	14.0	17.0	14.0	9.5	8.0
23			18.0	15.0	19.0	14.5	18.5	14.5	18.5	14.5	9.5	7.0
24			18.0	16.5	19.0	16.5	19.0	15.5	19.5	15.5	10.0	7.5
25			17.5	15.5	18.5	16.0	19.0	16.0	18.5	14.5	10.0	10.0
26			17.5	15.5	18.5	13.5	19.0	17.0	17.5	14.5	10.5	10.0
27			16.5	14.5	19.5	14.0	17.5	14.5	15.5	14.5	11.0	10.0
28			17.0	13.5	19.0	15.5	16.5	14.0	14.5	14.0	10.5	8.5
29			18.5	15.5	18.5	17.0	17.5	13.0	16.0	14.0	10.0	9.0
30			19.0	16.0	21.5	16.5	18.5	13.5	16.5	14.5	9.5	8.5
31			18.0	14.0	---	---	19.5	14.5	18.0	15.0	---	---
MONTH					23.0	13.5	23.5	13.0	20.5	13.0	17.5	7.0

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW¼ sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft (46 m) upstream from bridge on State Highway 33 in Mio, 500 ft (152 m) downstream from Mio hydroelectric plant, 9.5 mi (15.3 km) downstream from Big Creek, and 73.0 mi (117.5 km) upstream from mouth.

DRAINAGE AREA.--1,100 mi^2 (2,850 km^2), approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft (283.342 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated at all stages by hydroelectric plant 500 ft (152 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 985 ft^3/s (27.90 m^3/s), 12.16 in/yr (309 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft^3/s (118 m^3/s) Mar. 28, 1976, gage height, 6.14 ft (1.871 m); minimum, 7.0 ft^3/s (0.20 m^3/s) Aug. 4, 1977, gage height, -0.09 ft (-0.027 m); minimum daily, 21 ft^3/s (0.59 m^3/s) Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,620 ft^3/s (74.2 m^3/s) June 12, gage height, 4.92 ft (1.500 m); minimum, 115 ft^3/s (3.26 m^3/s) Oct. 30, gage height, 0.87 ft (0.265 m); minimum daily, 606 ft^3/s (17.2 m^3/s) Jan. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	844	867	874	856	750	1320	1410	1530	828	766	685	780
2	874	837	860	846	810	1230	1400	1240	847	763	686	806
3	902	838	732	724	750	1150	1220	1190	844	762	680	780
4	928	878	725	606	680	1040	1170	1200	835	749	725	740
5	943	890	914	671	640	1010	1320	1130	870	775	715	730
6	929	890	928	825	730	1000	1220	1090	874	795	705	730
7	906	887	879	874	793	975	1080	1040	818	761	705	730
8	896	889	940	759	793	932	1090	1070	819	706	830	740
9	876	893	1080	700	780	943	1560	1060	820	678	836	745
10	861	883	1080	775	730	954	1590	1040	835	683	765	745
11	860	858	936	770	750	954	1350	1120	829	683	775	745
12	861	863	800	740	730	953	1180	1160	920	683	750	720
13	863	852	838	720	700	955	1160	1120	754	683	700	695
14	871	907	921	780	782	962	1210	1060	806	683	685	700
15	899	931	857	840	820	947	1250	1040	805	683	715	710
16	887	937	873	790	801	971	1240	1000	920	685	780	715
17	892	892	731	760	860	999	1190	956	953	689	765	730
18	907	881	666	850	902	986	1160	997	883	716	730	730
19	916	889	779	800	1070	930	1100	924	825	793	725	705
20	896	858	723	780	1120	908	1070	916	779	815	675	715
21	893	850	732	750	1130	914	1070	911	769	889	670	720
22	909	851	811	720	1130	953	1020	896	834	857	665	710
23	900	828	871	770	1220	946	1110	896	880	782	665	695
24	869	872	840	845	1260	920	1220	903	850	709	665	695
25	890	877	767	800	1220	910	1220	988	797	692	665	720
26	912	836	749	792	1140	980	1140	1230	723	733	665	735
27	910	829	828	804	1120	1020	1040	1030	711	716	685	715
28	905	838	824	776	1310	1060	1120	929	730	694	695	735
29	897	847	890	725	---	1130	1700	914	728	728	755	720
30	877	878	899	671	---	1410	1840	914	757	733	842	715
31	888	---	871	644	---	1390	---	855	---	696	800	---
TOTAL	27661	26126	26258	23765	25521	31752	37450	32349	24643	22780	22404	21851
MEAN	892	871	847	767	911	1024	1248	1044	821	735	723	728
MAX	943	937	1080	874	1310	1410	1840	1530	953	889	842	806
MIN	844	828	666	606	640	908	1020	855	711	678	665	695
CFSM	.81	.79	.77	.70	.83	.93	1.14	.95	.75	.67	.66	.66
IN.	.94	.88	.89	.80	.86	1.07	1.27	1.09	.83	.77	.76	.74

CAL YR 1980 TOTAL 343575 MEAN 939 MAX 2220 MIN 579 CFSM .85 IN 11.62
WTR YR 1981 TOTAL 322560 MEAN 884 MAX 1840 MIN 606 CFSM .80 IN 10.91

04137500 AU SABLE RIVER NEAR AU SABLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°26'09", long 83°26'28", in NE¼ NW¼ sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, 5.5 mi (8.8 km) northwest of Au Sable and 10.4 mi (16.7 km) upstream from mouth.

DRAINAGE AREA.--1,540 mi² (3,990 km²), approximately.

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981 (discontinued).
WATER TEMPERATURES: April 1978 to September 1981 (discontinued).

REMARKS.--Daily record based on samples collected at mid-stream of bridge .6 mi (1.0 km) downstream from Foote Dam. Daily samples collected randomly throughout the day. Bi-monthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 346 micromhos Nov. 21, 1978; minimum daily, 229 micromhos Apr. 19, 21, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C Aug. 12, 1980; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 07...	1030	2110	264	8.2	13.0	9.0	86	K2	<1	140	0	37
NOV 04...	1400	1340	--	8.3	7.5	11.6	98	<1	<1	140	0	40
JAN 06...	1445	1000	348	8.0	.0	11.4	80	<1	<1	160	6	46
MAR 24...	1345	610	249	7.9	2.5	12.6	93	<1	<1	140	9	39
MAY 05...	1330	2550	253	8.1	12.0	10.2	95	<1	K4	140	17	42
JUL 07...	1330	3290	271	8.0	25.0	8.1	98	K4	K4	150	19	42
SEP 01...	1230	2380	264	7.8	23.0	7.5	88	K2	K11	150	11	41

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCT/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 07...	11	4.4	6	.2	.5	.40	170	0	140	1.7	8.2
NOV 04...	9.8	4.0	6	.1	.6	--	180	0	150	1.4	10
JAN 06...	10	4.1	5	.1	.6	.40	210	0	170	2.9	11
MAR 24...	9.3	3.8	6	.1	.8	.60	160	0	130	3.2	9.2
MAY 05...	9.5	4.0	6	.1	.6	.40	150	0	130	2.0	8.1
JUL 07...	10	4.4	6	.2	.5	.40	160	0	130	2.7	8.6
SEP 01...	11	4.2	6	.2	.3	--	170	0	140	4.3	1.9

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 07...	4.9	.1	8.9	165	159	940	.01	.01	.020	.010	.02
NOV 04...	5.1	.1	8.0	185	162	669	.00	.00	.020	.020	.03
JAN 06...	5.8	.1	8.7	183	177	494	.09	.09	.020	.020	.03
MAR 24...	4.6	<.1	9.0	147	155	242	.18	.18	.090	.090	--
MAY 05...	4.6	<.1	7.6	160	155	1100	.04	.03	.060	.060	--
JUL 07...	5.1	.1	8.6	168	164	1490	.01	.01	.010	.010	--
SEP 01...	5.4	<.1	9.4	174	158	1120	.04	.03	.040	.020	--

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 07...	.11	.13	.14	.62	.020	.06	.010	--	11	63	100
NOV 04...	--	--	--	--	.030	.09	.020	6.9	1	3.6	100
JAN 06...	.11	.13	.22	1.0	.040	.12	.000	--	3	8.1	100
MAR 24...	--	<.10	--	--	.030	.09	.010	--	4	6.6	100
MAY 05...	.28	.34	.38	1.7	.010	.03	<.010	4.3	2	14	100
JUL 07...	.28	.29	.30	1.3	<.010	.03	<.010	--	7	62	100
SEP 01...	.25	.29	.33	1.5	.020	.06	.020	--	4	26	100

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 07...	1030	3	3	100	30	0	0	10	10	0	0
JAN 06...	1445	3	3	100	30	0	0	10	<10	0	0
MAR 24...	1345	0	0	100	100	0	0	10	<10	0	0
JUL 07...	1330	2	2	100	20	1	<1	<10	10	1	1
SEP 01...	1230	2	2	<50	<50	<1	<1	10	10	<1	<1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 07...	5	2	100	0	0	0	20	1	.2	.2
JAN 06...	7	3	120	0	4	0	30	10	.4	.4
MAR 24...	8	2	150	20	21	1	20	10	.2	<.1
JUL 07...	8	7	100	<10	9	1	10	1	.2	.1
SEP 01...	4	4	100	10	1	<1	20	10	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 07...	1	0	0	0	0	0	20	7	10	.5
JAN 06...	3	2	0	0	0	0	30	4	2.6	--
MAR 24...	2	2	0	0	0	0	30	20	3.5	.2
JUL 07...	6	6	0	0	0	0	90	5	3.7	.6
SEP 01...	4	1	<1	<1	<1	<1	30	10	2.8	--

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 4,80	MAR 24,81	MAY 15,81	JUL 7,81	SEP 1,81
TIME	1400	1345	1330	1330	1230
TOTAL CELLS/ML	460	150	300	450	500
DIVERSITY: DIVISION	1.0	0.9	1.9	0.2	1.3
.CLASS	1.0	0.9	1.9	0.2	1.3
..ORDER	1.1	1.3	2.4	1.0	1.3
...FAMILY	1.1	1.3	2.4	1.0	1.3
....GENUS	1.2	1.3	2.4	1.0	1.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	95#	19
...OOCYSTACEAE										
....SELENASTRUM	13	3	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	100#	35	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	13	3	52#	33	26	9	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13	3	--	-	--	-	--	-	--	-
....MELOSIRA	360#	78	--	-	--	-	120#	26	--	-
....STEPHANODISCUS	--	-	90#	58	26	9	--	-	--	-
..PENNALES										
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	320#	71	230#	46
....SYNEDRA	--	-	--	-	--	-	--	-	82#	16
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	13	8	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	39	13	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	26	6	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	39	13	--	-	95#	19
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	39	8	--	-	64#	22	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..DINOKONTAE										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	13	3	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---			---	292	301	303	299
2	---	---	---	333	338			---	293	305	308	306
3	---	311	---	---	---			---	292	301	302	305
4	---	311	---	---	---			---	292	---	314	---
5	---	311	---	324	---			---	291	301	302	297
6	---	333	---	324	---			---	298	309	314	307
7	---	320	---	335	---			---	292	302	309	299
8	---	311	---	326	---			---	292	302	302	304
9	---	---	---	---	327			---	300	303	302	299
10	---	---	---	333	---			---	298	313	314	305
11	---	---	---	---	---			---	299	324	303	304
12	---	---	---	---	---			---	299	320	307	306
13	---	---	---	333	338			---	300	300	308	306
14	---	---	---	329	283			---	292	302	302	305
15	---	---	---	---	---			---	300	299	308	297
16	---	---	---	---	327			---	301	302	307	296
17	---	---	322	---	327			---	300	302	303	310
18	---	264	---	---	---			---	301	302	317	306
19	---	---	---	303	---			---	310	300	316	306
20	---	---	---	327	301			---	298	300	314	308
21	---	---	---	331	---			---	302	313	302	306
22	---	---	---	327	---			---	300	302	303	310
23	---	---	---	---	---			---	301	300	313	306
24	---	---	---	307	---			290	309	302	303	307
25	---	313	---	---	---			290	302	298	302	330
26	---	313	---	329	---			303	300	300	316	309
27	---	---	---	305	---			292	300	300	303	307
28	---	---	---	327	---			295	306	303	302	307
29	---	---	---	329	---			290	301	302	---	291
30	333	---	---	---	---			289	309	303	---	299
31	---	---	---	325	---			292	---	307	302	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		---		---	---			---	16.0	20.0	22.0	22.0
2		---		.0	.0			---	17.0	20.0	23.0	21.0
3		---		---	---			---	18.0	20.0	23.0	21.0
4		8.0		---	---			---	17.0	22.0	23.0	21.0
5		8.0		.0	---			---	20.0	22.0	23.0	20.0
6		8.0		.0	---			---	20.0	22.0	23.0	20.0
7		8.0		.0	---			---	18.0	24.0	23.0	20.0
8		---		.0	---			---	19.0	25.0	22.0	20.0
9		---		---	---			---	18.0	24.0	22.0	19.0
10		---		.0	---			---	18.0	24.0	23.0	20.0
11		---		---	---			---	18.0	24.0	23.0	20.0
12		---		---	---			---	19.0	24.0	23.0	20.0
13		---		.0	---			---	19.0	25.0	23.0	21.0
14		---		.0	---			---	20.0	25.0	23.0	20.0
15		---		---	---			---	20.0	24.0	23.0	19.0
16		---		---	---			---	20.0	23.0	21.0	19.0
17		---		---	---			---	20.0	24.0	21.0	19.0
18		---		---	---			---	20.0	23.0	21.0	19.0
19		---		.0	---			---	20.0	24.0	21.0	18.0
20		---		.0	---			---	20.0	24.0	21.0	21.0
21		---		.0	---			---	20.0	23.0	21.0	20.0
22		---		.0	---			---	20.0	22.0	21.0	19.0
23		---		---	---			---	20.0	22.0	22.0	19.0
24		---		---	---			15.0	20.0	23.0	21.0	19.0
25		---		---	---			15.0	20.0	23.0	21.0	18.0
26		---		.0	---			16.0	20.0	23.0	21.0	17.0
27		---		.0	---			15.0	20.0	22.0	21.0	15.0
28		---		.0	---			16.0	20.0	20.0	21.0	15.0
29		---		.0	---			16.0	20.0	22.0	22.0	15.0
30		---		---	---			17.0	20.0	22.0	21.0	15.0
31		---		.0	---			17.0	---	21.0	22.0	---

04138500 AU GRES RIVER NEAR NATIONAL CITY, MI

LOCATION.--Lat 44°10'26", long 83°44'36", in NE¼ NE¼ sec.31, T.21 N., R.6 E., Iosco County, Hydrologic Unit 04080101, on left bank 15 ft (5 m) upstream from highway bridge on Allen Road, 1.7 mi (2.7 km) upstream from Elm Creek, 4.4 mi (7.1 km) southwest of National City, 12.8 mi (20.6 km) southwest of Tawas City, and 13 mi (21 km) upstream from mouth.

DRAINAGE AREA.--169 mi^2 (438 km^2).

PERIOD OF RECORD.--October 1950 to September 1981 (discontinued). Monthly discharge only October, November, 1950, published in WSP 1727.

REVISED RECORDS.--WSP 1911: 1959-60.

GAGE.--Water-stage recorder. Datum of gage is 616.24 ft (187.830 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Department of Agriculture). Prior to Oct. 1, 1951, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum. Oct. 1, 1951 to July 24, 1969, water-stage recorder at site 50 ft (15 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low flows. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 97.3 ft^3/s (2.756 m^3/s), 7.82 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft^3/s (77.0 m^3/s) Mar. 21, 1976; maximum gage height, 10.64 ft (3.243 m) Mar. 6, 1974, backwater from ice; minimum discharge, 5.9 ft^3/s (0.17 m^3/s) Nov. 3, 1966, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,550 ft^3/s (43.9 m^3/s) Feb. 19, gage height, 8.00 ft (2.44 m) from correlation with nearby stations; minimum discharge, 16 ft^3/s (0.453 m^3/s) July 27, Aug. 1, Aug. 23-27; minimum gage height, 0.74 ft (0.226 m) Aug. 23-27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	55	70	47	46	385	148	315	62	47	17	49
2	43	50	60	47	46	274	142	255	57	39	17	51
3	52	48	61	47	46	229	134	216	48	32	18	43
4	73	52	63	47	47	198	117	194	46	39	19	142
5	59	60	64	47	47	174	121	181	45	180	22	189
6	50	57	67	47	47	154	95	157	41	64	18	110
7	41	58	90	47	47	169	80	141	39	41	22	74
8	39	73	219	47	47	139	80	134	37	31	162	62
9	38	75	250	47	47	139	665	128	37	32	62.	48
10	35	72	186	47	48	143	514	135	35	37	38	47
11	37	67	150	47	48	137	317	242	33	33	33	40
12	56	61	125	46	48	128	253	333	33	30	26	35
13	55	64	105	47	48	143	204	278	36	36	24	32
14	60	127	88	47	49	124	259	233	38	34	24	29
15	67	121	76	47	51	128	276	172	41	30	46	26
16	74	100	69	47	56	130	244	144	108	27	39	29
17	129	87	63	47	60	122	219	142	58	26	28	78
18	104	82	57	47	300	108	204	139	44	62	23	61
19	77	82	54	47	1200	98	177	125	38	35	20	42
20	68	73	52	47	1200	102	162	90	33	29	19	33
21	61	70	50	47	1000	102	110	74	33	28	18	32
22	55	67	48	47	800	112	107	69	49	24	18	43
23	50	64	48	47	870	108	169	66	50	20	18	37
24	61	66	48	47	960	106	217	63	38	20	17	32
25	73	60	48	47	600	102	194	72	34	18	17	30
26	64	65	47	47	370	104	177	76	31	17	18	46
27	58	73	47	46	220	122	154	73	29	17	19	56
28	56	76	47	46	432	112	375	70	26	19	26	40
29	58	78	47	46	---	106	615	63	26	26	126	34
30	53	73	47	46	---	143	445	60	101	20	84	32
31	50	---	47	46	---	162	---	57	---	18	66	---
TOTAL	1835	2156	2493	1451	8780	4503	6974	4497	1326	1111	1104	1602
MEAN	59.2	71.9	80.4	46.8	314	145	232	145	44.2	35.8	35.6	53.4
MAX	129	127	250	47	1200	385	665	333	108	180	162	189
MIN	35	48	47	46	46	98	80	57	26	17	17	26
CFSM	.35	.43	.48	.28	1.86	.86	1.37	.86	.26	.21	.21	.32
IN.	.40	.47	.55	.32	1.93	.99	1.54	.99	.29	.24	.24	.35

CAL YR 1980 TOTAL 30633 MEAN 83.7 MAX 369 MIN 19 CFSM .50 IN 6.74
WTR YR 1981 TOTAL 37832 MEAN 104 MAX 1200 MIN 17 CFSM .62 IN 8.33

04140500 RIFLE RIVER AT SELKIRK, MI

LOCATION.--Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, on left bank at upstream side of bridge on State Road at Selkirk, 1.0 mi (1.6 km) downstream from Klacking Creek.

DRAINAGE AREA.--117 mi^2 (303 km^2).

PERIOD OF RECORD.--September 1950 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 828.47 ft (252.518 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--31 years, 143 ft^3/s (4.050 m^3/s), 16.60 in/yr (422 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,760 ft^3/s (78.2 m^3/s) May 20, 1959, gage height, 6.76 ft (2.060 m); minimum, 52 ft^3/s (1.47 m^3/s) July 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft^3/s (14.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 21	1200	ice jam		*3.83	1.167	Apr. 29	1700	628	17.8	3.17	0.966
Apr. 10	0200	*714	20.2	3.40	1.036						

Minimum discharge, 68 ft^3/s (1.93 m^3/s) July 14, 15; minimum gage height, 1.49 ft (0.454 m) Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	104	107	114	115	98	337	301	321	104	177	78	111
2	108	104	118	115	98	258	266	263	100	129	77	117
3	141	105	118	115	98	209	233	230	103	112	78	107
4	151	114	118	115	98	193	252	210	113	102	79	120
5	130	120	120	115	98	183	239	198	105	103	81	135
6	122	115	121	115	98	174	199	187	98	94	78	115
7	117	114	143	112	98	161	179	173	93	88	82	109
8	112	119	228	112	98	166	201	163	93	81	97	108
9	107	123	256	110	98	171	578	156	92	79	90	100
10	105	121	205	110	98	183	643	171	91	75	84	93
11	105	113	180	110	98	173	390	330	88	74	82	89
12	109	108	160	112	98	169	268	416	89	77	80	87
13	107	120	145	112	100	192	222	319	94	75	81	85
14	106	205	135	112	100	167	305	238	96	70	87	84
15	119	176	130	112	102	174	324	212	96	69	110	82
16	125	147	130	112	105	188	243	195	119	72	97	84
17	129	129	125	112	115	170	221	179	107	88	85	97
18	145	126	125	112	125	151	206	165	95	179	80	91
19	130	117	125	112	150	139	192	157	90	122	81	87
20	122	116	122	115	165	135	180	147	87	105	80	85
21	119	116	120	112	200	136	167	139	89	107	78	84
22	115	114	120	110	240	147	165	132	129	96	77	84
23	110	113	120	105	370	155	192	127	120	87	77	86
24	108	117	120	102	440	163	233	132	103	83	78	82
25	130	114	120	100	423	168	210	157	97	81	77	83
26	133	108	118	100	311	170	192	149	90	80	77	100
27	123	105	118	98	251	180	184	137	85	77	81	101
28	123	111	118	98	329	207	343	132	82	83	92	89
29	114	115	118	98	---	217	596	123	122	96	129	89
30	113	114	115	98	---	271	488	116	274	84	160	88
31	111	---	115	98	---	341	---	107	---	80	124	---
TOTAL	3693	3626	4220	3374	4702	5848	8412	5881	3144	2925	2737	2872
MEAN	119	121	136	109	168	189	280	190	105	94.4	88.3	95.7
MAX	151	205	256	115	440	341	643	416	274	179	160	135
MIN	104	104	114	98	98	135	165	107	82	69	77	82
CFSM	1.02	1.03	1.16	.93	1.44	1.62	2.39	1.62	.90	.81	.76	.82
IN.	1.17	1.15	1.34	1.07	1.49	1.86	2.67	1.87	1.00	.93	.87	.91

CAL YR 1980 TOTAL 50003 MEAN 137 MAX 503 MIN 85 CFSM 1.17 IN 15.90
WTR YR 1981 TOTAL 51434 MEAN 141 MAX 643 MIN 69 CFSM 1.21 IN 16.35

04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE¼ SW¼ sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft (9 m) downstream from bridge on Old M-70, 2.8 mi (4.5 km) north of Sterling, and 20 mi (32 km) upstream from mouth.

DRAINAGE AREA.--320 mi² (830 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft (197.962 m) National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft (122 m) downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--45 years, 306 ft³/s (8.666 m³/s), 12.99 in/yr (330 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft³/s (151 m³/s) Mar. 28, 1950, gage height, 13.74 ft (4.188 m), from rating curve extended above 3,800 ft³/s (108 m³/s); minimum, 75 ft³/s (2.12 m³/s) Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,650 ft³/s (46.7 m³/s) Apr. 10, gage height, 6.37 ft (1.942 m); maximum gage height, 7.95 ft (2.423 m) Feb. 23, backwater from ice; only peak above base of 1,600 ft³/s (45.3 m³/s); minimum discharge, 132 ft³/s (3.74 m³/s) July 15, gage height, 1.35 ft (0.411 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	234	236	190	180	960	609	880	203	385	143	274
2	195	259	249	190	180	751	551	661	200	258	143	246
3	230	237	243	190	180	585	474	537	197	213	145	227
4	287	238	250	190	180	527	480	460	208	197	147	263
5	261	247	250	185	185	484	476	432	206	241	147	287
6	233	232	255	185	185	450	393	404	192	211	146	240
7	226	220	290	185	185	408	357	368	181	183	178	210
8	210	228	476	185	185	401	349	339	176	165	219	207
9	199	231	655	180	190	393	1300	308	183	157	207	194
10	193	231	500	180	190	406	1460	295	180	147	182	182
11	189	218	235	180	190	397	983	591	173	140	165	172
12	191	209	230	180	190	375	661	1010	169	146	156	163
13	191	210	225	180	195	407	523	814	180	145	171	159
14	195	331	220	180	195	383	666	585	184	139	182	154
15	214	369	220	180	200	371	777	493	202	134	241	149
16	246	321	220	175	200	400	591	435	258	136	228	158
17	260	294	218	175	220	375	516	407	234	156	180	209
18	296	264	215	175	340	336	503	367	198	293	161	196
19	287	244	210	175	470	307	479	326	182	275	151	177
20	274	227	210	175	560	296	431	280	174	223	147	168
21	250	225	205	175	700	288	391	265	178	200	144	183
22	233	259	202	175	900	297	360	254	248	187	141	201
23	222	267	200	175	1100	307	399	240	291	168	139	206
24	216	256	200	175	1200	319	499	245	240	157	137	192
25	246	248	200	175	1220	345	465	291	199	153	136	189
26	274	233	200	175	912	343	415	296	171	149	136	230
27	255	227	198	175	718	349	377	267	160	147	148	248
28	241	235	195	175	889	395	885	249	154	155	163	202
29	232	237	195	175	---	421	1480	238	154	173	309	189
30	220	237	195	175	---	499	1330	228	453	162	375	187
31	217	---	190	175	---	658	---	213	---	149	330	---
TOTAL	7171	7468	7787	5560	12239	13233	19100	12778	6128	5744	5597	6062
MEAN	231	249	251	179	437	427	637	412	204	185	181	202
MAX	296	369	655	190	1220	960	1480	1010	453	385	375	287
MIN	189	209	190	175	180	288	349	213	154	134	136	149
CFSM	.72	.78	.78	.56	1.37	1.33	1.99	1.29	.64	.58	.57	.63
IN.	.83	.87	.91	.65	1.42	1.54	2.22	1.49	.71	.67	.65	.70

CAL YR 1980 TOTAL 96538 MEAN 264 MAX 1070 MIN 140 CFSM .83 IN 11.22
WTR YR 1981 TOTAL 108867 MEAN 298 MAX 1480 MIN 134 CFSM .93 IN 12.66

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981 (discontinued).
WATER TEMPERATURES: November 1974 to September 1981 (discontinued).
SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water-quality monitor August 1975 to September 1981 (discontinued).

REMARKS.--Monthly samples are collected as a cross-section sample at or near vicinity of bridge. Interruptions in the daily record are due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 567 micromhos Sept. 6, 1978; minimum, 157 micromhos Aug. 31, 1975.
WATER TEMPERATURES: Maximum, 30.5ºC July 20, 1977; minimum, 0.0ºC on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
24...	1030	218	447	8.4	5.5	13.2	106	K8	K8	210	27	58
NOV												
21...	1030	226	464	8.2	2.5	13.6	101	K14	K2	200	24	57
DEC												
11...	1100	237	486	8.1	.0	15.7	108	65	280	210	27	58
JAN												
15...	1100	178	456	7.8	.0	10.9	76	K9	K10	210	27	58
FEB												
09...	1200	189	455	7.6	.0	11.5	80	44	K16	210	21	56
MAR												
04...	1100	521	398	8.0	1.0	12.0	86	K22	K24	170	22	48
APR												
16...	1330	567	357	8.2	9.5	11.2	98	K32	81	170	14	49
MAY												
14...	1030	595	382	7.6	11.0	9.2	84	K50	K82	180	24	52
JUN												
11...	1330	169	437	8.2	19.5	10.4	116	K22	K9	220	40	62
JUL												
16...	0930	128	393	7.9	19.0	9.0	98	85	140	220	48	59
AUG												
04...	1300	141	404	7.7	21.5	9.6	110	79	57	210	44	57
SEP												
02...	1130	235	392	7.9	19.0	9.0	98	120	77	200	28	57

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCT/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
24...	15	10	9	.3	12	--	220	4	180	1.4	29
NOV											
21...	15	11	10	.3	1.1	--	220	0	180	2.2	33
DEC											
11...	15	11	10	.3	1.9	--	220	0	180	2.8	36
JAN											
15...	15	10	9	.3	1.1	--	230	0	190	5.6	28
FEB											
09...	16	10	10	.3	1.0	.70	230	0	190	8.8	31
MAR											
04...	13	8.6	10	.3	2.3	1.7	180	0	150	3.1	26
APR											
16...	12	7.7	9	.3	1.7	1.3	190	0	160	1.8	25
MAY											
14...	13	9.6	10	.3	1.6	1.2	190	0	160	7.8	24
JUN											
11...	15	12	11	.4	1.0	.70	220	0	180	2.2	28
JUL											
16...	17	13	11	.4	.9	.70	210	0	170	4.4	29
AUG											
04...	16	11	10	.3	.9	.70	200	0	160	6.6	27
SEP											
02...	14	9.5	9	.3	1.0	--	210	0	170	4.2	17

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 24...	17	.1	6.4	266	256	157	.08	.08	.010	.010	.01
NOV 21...	19	.1	6.8	282	252	172	.24	.22	.040	.000	.05
DEC 11...	21	--	8.4	287	262	184	.49	.49	.050	.050	.06
JAN 15...	17	.2	11	262	250	126	.31	.28	.100	.080	.12
FEB 09...	14	.1	2.4	263	239	134	.28	.01	.050	--	--
MAR 04...	14	.1	7.3	230	218	324	.46	.46	.110	.110	--
APR 16...	14	.1	6.0	232	207	355	.25	.25	.060	.060	--
MAY 14...	14	.1	6.1	236	218	379	.23	.23	.080	.080	--
JUN 11...	16	.2	5.8	280	249	128	.05	.05	.040	.040	--
JUL 16...	16	.1	6.0	272	249	94.0	.03	.03	<.010	<.010	--
AUG 04...	14	.1	1.1	255	226	97.1	.03	.03	.020	.020	--
SEP 02...	15	.1	8.0	253	224	161	.16	.12	.050	.020	--

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 24...	.28	.29	.37	1.6	.020	.06	.010	--	5	2.9	100
NOV 21...	.34	.38	.62	2.7	.020	.06	.020	8.6	5	3.1	100
DEC 11...	.25	.30	.79	3.5	.020	.06	.010	--	8	5.1	100
JAN 15...	.23	.33	.64	2.8	.030	.09	<.010	4.8	14	6.7	100
FEB 09...	.05	.10	.38	1.7	.030	.09	.020	--	12	6.1	100
MAR 04...	.50	.61	1.1	4.7	.050	.15	.020	--	42	59	100
APR 16...	.48	.54	.79	3.5	.050	.15	.030	13	52	80	100
MAY 14...	.68	.76	.99	4.4	.070	.21	<.010	4.0	50	80	100
JUN 11...	.17	.21	.26	1.2	<.010	.03	<.010	--	10	4.6	100
JUL 16...	--	.54	.57	2.5	<.010	.03	<.010	4.4	16	5.5	100
AUG 04...	.31	.33	.36	1.6	.030	.09	<.010	9.6	21	8.0	100
SEP 02...	.27	.32	.48	2.1	.030	.09	.010	--	26	16	100

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)
OCT 24...	1030	4	4	100	60	0	0	20	20	0	0
DEC 11...	1100	2	1	100	60	3	3	100	10	3	2
MAR 04...	1100	1	0	100	100	0	0	20	10	0	0
JUN 11...	1330	1	1	100	40	1	1	20	10	1	0
SEP 02...	1130	4	3	100	<50	<1	<1	<10	<10	<1	<1

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)
OCT 24...	3	2	190	30	1	1	20	10	.2	<.1
DEC 11...	4	2	320	50	4	2	40	20	.4	.4
MAR 04...	5	2	740	90	6	2	70	30	<.1	<.1
JUN 11...	2	1	250	20	5	0	10	10	<.1	<.1
SEP 02...	6	3	840	20	4	<1	60	20	<.1	<.1

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
OCT 24...	2	0	0	0	0	0	40	20	11	.4
DEC 11...	1	0	0	0	0	0	20	0	9.0	.4
MAR 04...	4	3	0	0	1	0	90	10	8.5	1.0
JUN 11...	4	3	0	0	0	0	50	<4	5.2	.5
SEP 02...	4	<1	<1	<1	<1	<1	30	10	6.2	.8

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 21,80	MAR 4,81	MAY 14,81	JUN 11,81
TIME	1030	1100	1030	1330
TOTAL CELLS/ML	340	520	1100	3400
DIVERSITY: DIVISION	0.5	0.7	1.1	1.6
.CLASS	0.5	0.7	1.2	1.6
..ORDER	1.1	0.8	1.6	2.0
...FAMILY	2.7	0.9	2.5	3.1
....GENUS	2.7	0.9	2.5	3.2

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	110	3
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	42	1
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	210	6
....TETRASTRUM	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	26	5	--	-	98	3
...VOLVOCACEAE								
....PANDORINA	--	-	--	-	--	-	220	7
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	*	0
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	52#	15	--	-	--	-	150	4
....STEPHANODISCUS	--	-	--	-	98	9	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	13	4	--	-	--	-	98	3
....COCCONEIS	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	*	0
...CYMBELLACEAE								
....CYMBELLA	26	8	--	-	26	2	380	11
...DIATOMACEAE								
....DIATOMA	26	8	13	2	77	7	70	2
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	170#	16	--	-
....FRAGILARIA	--	-	--	-	--	-	56	2
....SYNEDRA	100#	31	--	-	--	-	110	3
...NAVICULACEAE								
....ANOMOEONEIS	--	-	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-
....NAVICULA	77#	23	26	5	260#	24	240	7
...NITZSCHIACEAE								
....NITZSCHIA	13	4	--	-	26	2	210	6
...SURIRELLACEAE								
....CYMATOPLEURA	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
...SYNURACEAE								
....MALLOMONAS	--	-	--	-	13	1	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	28	1
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	13	1	--	-

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 21,80		MAR 4,81		MAY 14,81		JUN 11,81	
TIME	1030		1100		1030		1330	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	13	2	370#	35	1400#	40
..NOSTOCALES								
...HAMMATOIDEACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	440#	85	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	13	4	--	-	13	1	*	0
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..DINOKONTAE								
...GLENODINIACEAE								
....GLENODINIUM	13	4	--	-	--	-	--	-

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 16,81		AUG 4,81		SEP 2,81	
TIME	0930		1300		1130	
TOTAL CELLS/ML	950		740		2500	
DIVERSITY: DIVISION	1.8		0.9		1.6	
.CLASS	1.8		0.9		1.7	
..ORDER	2.2		1.4		2.2	
...FAMILY	2.8		2.1		3.6	
....GENUS	3.2		2.1		4.1	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....SCHROEDERIA	--	-	--	-	70	3
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	--	-	--	-	14	1
...OOCYSTACEAE						
....ANKISTRODESMUS	39	4	--	-	150	6
....KIRCHNERIELLA	--	-	--	-	14	1
....OOCYSTIS	13	1	--	-	--	-
....SELENASTRUM	100	11	--	-	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	--	-	180	7
....SCENEDESMUS	150#	16	400#	55	340	13
....TETRASTRUM	51	5	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	64	7	--	-	56	2
...VOLVOCACEAE						
....PANDORINA	--	-	110#	15	--	-
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	51	5	--	-	56	2
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	150	6
....COCCONEIS	--	-	--	-	140	6
....RHOICOSPHENIA	--	-	--	-	14	1
...CYMBELLACEAE						
....CYMBELLA	--	-	28	4	130	5
...DIATOMACEAE						
....DIATOMA	--	-	14	2	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	110	4
....SYNEDRA	--	-	56	8	--	-
...NAVICULACEAE						
....ANOMOEONEIS	--	-	--	-	14	1
....GYROSIGMA	13	1	--	-	14	1
....NAVICULA	26	3	56	8	290	12
...NITZSCHIACEAE						
....NITZSCHIA	77	8	69	9	110	4
...SURIRELLACEAE						
....CYMATOPLEURA	--	-	--	-	14	1
....SURIRELLA	13	1	--	-	14	1
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...OCHROMONADACEAE						
....OCHROMONAS	--	-	--	-	28	1
...SYNURACEAE						
....MALLOMONAS	--	-	--	-	14	1
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	39	4	--	-	28	1

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 16,81		AUG 4,81		SEP 2,81	
TIME	0930		1300		1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	--	-	210	8
..NOSTOCALES						
...HAMMATOIDEACEAE						
....RAPHIDIOPSIS	--	-	--	-	220	9
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	110	4
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	300#	31	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	13	1	--	-	14	1
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..DINOKONTAE						
...GLENODINIACEAE						
....GLENODINIUM	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	466	459	464	455	448	453	478	470	474			
2	461	453	458	447	439	441	481	475	479			
3	456	449	453	443	437	440	497	479	487			
4	451	449	450	442	439	441	523	489	502			
5	459	453	455	441	439	440	526	493	506			
6	461	457	459	443	438	441	496	490	494			
7	469	462	465	445	443	444	494	491	493			
8	468	460	464	444	442	443	500	478	494			
9	461	457	459	446	441	444	480	460	471			
10	460	455	458	444	441	443	463	461	462			
11	459	455	457	445	441	444	---	---	---			
12	459	456	457	446	441	443	---	---	---			
13	459	455	456	445	443	444	---	---	---			
14	457	449	453	443	438	441	---	---	---			
15	456	450	453	443	439	440	---	---	---			
16	459	452	455	447	437	441	---	---	---			
17	465	458	462	440	435	437	---	---	---			
18	465	463	464	440	436	438	---	---	---			
19	468	463	465	446	437	441	---	---	---			
20	462	460	461	446	442	444	---	---	---			
21	461	459	460	443	439	441	---	---	---			
22	459	457	459	450	438	445	---	---	---			
23	459	457	458	440	439	439	---	---	---			
24	462	456	459	444	442	443	---	---	---			
25	459	457	458	449	446	448	---	---	---			
26	457	454	456	453	449	452	---	---	---			
27	458	453	455	454	448	452	---	---	---			
28	457	455	456	456	451	454	---	---	---			
29	457	453	454	462	458	461	---	---	---			
30	457	455	456	467	465	466	---	---	---			
31	455	453	454	---	---	---	---	---	---			
MONTH	469	449	458	467	435	445						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	351	347	349	384	374	377	338	324	331
2	---	---	---	360	354	357	386	374	378	350	339	345
3	---	---	---	373	364	368	387	376	380	352	344	349
4	---	---	---	382	373	377	404	379	390	366	351	355
5	---	---	---	382	375	379	407	396	404	369	357	364
6	---	---	---	386	381	384	406	401	404	374	366	370
7	---	---	---	391	386	389	429	391	408	387	371	377
8	---	---	---	395	391	393	417	412	415	398	382	391
9	---	---	---	401	394	397	416	379	396	404	395	398
10	446	441	444	402	399	401	378	353	364	416	402	408
11	460	440	448	400	399	400	364	352	355	401	364	384
12	467	456	462	401	397	400	403	365	373	361	350	353
13	471	459	464	404	399	402	381	366	373	357	348	352
14	474	462	469	399	395	397	391	373	376	368	352	356
15	475	462	469	407	396	401	378	367	373	354	349	351
16	471	464	468	407	404	405	382	362	372	366	347	354
17	471	447	464	405	398	402	380	364	374	367	359	363
18	450	367	426	406	401	403	397	378	384	390	361	370
19	361	303	332	409	405	407	385	375	379	392	377	384
20	312	304	307	411	407	409	383	372	377	392	384	388
21	315	307	311	417	411	414	400	364	378	401	388	394
22	319	315	317	422	417	419	431	376	387	407	393	401
23	318	309	313	424	419	421	498	378	420	420	405	413
24	316	298	304	429	423	426	411	389	393	429	408	417
25	322	310	316	427	414	421	397	382	388	429	399	407
26	336	325	331	414	410	411	395	382	387	422	394	405
27	346	340	343	415	409	411	399	388	391	409	393	398
28	349	345	347	420	407	413	403	329	354	406	388	396
29	---	---	---	407	403	406	328	312	317	426	398	408
30	---	---	---	403	387	394	331	314	318	433	411	420
31	---	---	---	386	377	381	---	---	---	441	420	428
MONTH				429	347	398	498	312	380	441	324	382

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	442	430	436	416	358	383	374	364	367	436	400	415
2	453	433	443	425	384	406	370	363	365	416	397	405
3	463	442	450	432	411	424	374	364	368	421	381	406
4	465	441	449	435	419	427	396	364	376	457	396	408
5	462	444	454	430	407	417	424	401	415	431	416	423
6	481	451	463	---	---	---	445	427	439	437	418	424
7	474	447	457	---	---	---	456	435	447	452	424	433
8	485	435	450	---	---	---	469	439	456	438	409	424
9	442	432	436	---	---	---	474	468	471	---	---	---
10	440	429	434	---	---	---	470	457	464	---	---	---
11	442	415	425	---	---	---	461	445	455	---	---	---
12	432	418	425	---	---	---	454	446	449	---	---	---
13	431	417	425	---	---	---	452	437	444	---	---	---
14	432	426	428	---	---	---	445	396	423	---	---	---
15	463	393	441	---	---	---	422	400	411	---	---	---
16	441	381	421	---	---	---	428	399	411	---	---	---
17	440	422	433	407	341	385	411	403	407	---	---	---
18	437	423	431	383	343	363	419	408	413	435	414	421
19	443	422	434	392	359	366	421	413	416	428	374	391
20	439	420	431	379	361	369	455	406	427	380	365	372
21	434	407	424	381	366	376	428	411	419	394	356	374
22	421	390	408	381	368	375	442	419	429	373	357	366
23	395	384	389	379	366	372	478	406	429	369	358	363
24	405	387	398	387	369	377	429	419	425	376	365	371
25	436	397	417	390	372	380	442	412	426	385	368	376
26	451	417	434	385	370	375	---	---	---	387	372	380
27	465	418	436	384	371	377	417	398	407	381	374	379
28	471	420	450	391	360	376	416	381	404	389	376	383
29	459	434	448	376	362	368	425	402	416	403	380	389
30	457	372	416	370	366	368	425	406	414	408	394	400
31	---	---	---	375	364	368	415	393	402	---	---	---
MONTH	485	372	433									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.0	13.0	14.0	5.5	4.0	5.0	3.0	1.5	2.0			
2	15.0	13.0	14.0	7.0	5.0	5.5	2.0	.0	1.0			
3	13.5	9.5	11.5	7.5	5.5	6.5	2.0	.0	.5			
4	9.5	9.0	9.0	8.5	7.5	8.0	1.5	1.0	1.0			
5	9.5	8.0	9.0	7.5	6.0	7.0	1.5	1.0	1.0			
6	9.0	7.5	8.0	7.5	5.0	6.0	2.5	1.0	1.5			
7	10.5	7.0	8.5	6.5	5.5	6.0	---	---	---			
8	12.5	8.5	10.0	6.0	4.5	5.0	3.0	1.0	2.0			
9	11.5	8.5	10.0	6.5	5.0	5.5	2.0	1.5	2.0			
10	11.0	7.5	9.0	5.5	4.0	5.0	1.0	.0	.5			
11	9.5	9.0	9.0	4.0	2.5	3.5	---	---	---			
12	9.5	8.0	8.5	2.0	1.0	1.5	---	---	---			
13	8.0	7.0	7.5	4.0	2.0	2.5	---	---	---			
14	7.0	4.5	5.5	4.5	4.0	4.0	---	---	---			
15	6.0	5.0	5.5	4.5	4.0	4.0	---	---	---			
16	8.0	6.0	7.0	3.5	2.0	2.5	---	---	---			
17	11.0	8.0	9.5	2.5	1.5	2.0	---	---	---			
18	11.0	9.0	9.5	2.5	1.5	2.0	---	---	---			
19	9.5	8.5	9.0	2.0	.5	1.5	---	---	---			
20	9.0	8.0	8.5	3.0	1.0	1.5	---	---	---			
21	9.0	7.0	8.0	3.0	2.0	2.5	---	---	---			
22	8.5	7.0	7.5	4.0	1.0	2.0	---	---	---			
23	8.0	6.0	7.0	4.0	2.0	3.0	---	---	---			
24	9.0	6.0	7.5	4.5	3.5	4.0	---	---	---			
25	9.0	7.5	8.5	3.5	1.5	2.0	---	---	---			
26	7.5	6.0	6.5	1.5	.5	1.0	---	---	---			
27	6.5	5.0	6.0	1.0	.5	.5	---	---	---			
28	6.0	5.0	5.5	1.5	.5	1.5	---	---	---			
29	5.5	4.0	4.5	2.5	1.0	2.0	---	---	---			
30	5.5	3.5	4.5	3.0	1.5	2.0	---	---	---			
31	6.5	4.0	5.0	---	---	---	---	---	---			
MONTH	16.0	3.5	8.0	8.5	.5	3.5						

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	1.5	.5	1.0	9.0	6.5	7.5	11.5	8.0	10.0
2	---	---	---	1.0	.0	.5	10.5	5.5	8.0	13.0	9.0	11.0
3	---	---	---	1.5	.0	.5	9.5	6.5	7.5	15.0	10.0	12.5
4	---	---	---	2.0	.0	1.0	13.5	9.0	10.5	19.0	11.5	15.0
5	---	---	---	3.0	.5	1.5	10.0	6.0	8.5	18.5	16.0	17.5
6	---	---	---	1.5	.0	.5	9.5	5.0	7.0	17.5	13.0	15.0
7	---	---	---	2.5	.0	1.0	11.0	5.5	8.5	17.5	10.5	14.5
8	---	---	---	2.5	.5	1.5	11.0	8.5	10.0	17.5	11.5	14.5
9	---	---	---	4.0	1.0	2.5	11.5	9.0	10.0	20.0	13.0	16.0
10	.0	.0	.0	4.0	2.5	3.0	10.5	8.5	10.0	16.0	7.0	12.5
11	.5	.0	.0	3.0	1.5	2.0	13.0	9.5	11.5	7.0	5.0	5.5
12	1.0	.0	.5	4.0	.0	2.0	12.5	9.5	11.0	10.5	5.0	7.5
13	.5	.0	.5	4.0	1.5	3.0	11.0	9.0	10.0	14.0	9.0	11.0
14	.5	.0	.0	4.0	.0	2.0	11.0	8.5	10.0	11.5	11.0	11.5
15	1.0	.0	.0	5.0	2.0	3.5	10.5	7.0	9.0	11.5	9.5	10.5
16	.0	.0	.0	4.5	1.5	3.0	10.0	7.0	8.5	15.5	9.0	12.0
17	.0	.0	.0	5.0	.5	3.0	14.0	8.0	11.0	16.0	10.5	13.0
18	.0	.0	.0	3.0	.0	1.0	16.5	11.0	13.0	17.0	10.0	13.0
19	.0	.0	.0	1.5	.0	.0	13.0	8.5	10.5	18.5	11.5	15.0
20	.0	.0	.0	3.5	.0	1.5	9.5	4.5	6.5	20.0	12.0	16.0
21	.0	.0	.0	4.5	.5	3.0	10.5	4.0	7.5	23.5	14.5	18.5
22	.0	.0	.0	6.0	2.0	3.5	9.5	5.0	7.0	26.0	16.0	20.5
23	.0	.0	.0	8.0	3.0	5.0	12.0	6.5	9.0	25.5	18.5	22.0
24	1.0	.0	.0	7.5	4.0	6.0	10.5	6.5	8.5	23.0	20.5	21.5
25	1.0	.0	.5	9.5	4.0	6.0	9.0	5.5	7.5	24.0	17.0	20.5
26	2.5	.5	1.0	6.5	4.0	5.0	7.0	4.5	6.0	24.5	18.5	21.5
27	1.5	.0	1.0	9.5	4.0	6.5	10.5	5.0	7.5	21.5	17.5	19.0
28	1.5	1.0	1.5	9.5	4.5	7.0	10.0	7.5	8.5	23.5	14.5	18.5
29	---	---	---	11.0	5.5	8.5	9.0	6.0	7.5	24.0	16.5	20.5
30	---	---	---	10.5	7.5	9.0	10.0	7.0	8.5	23.5	18.5	21.0
31	---	---	---	9.0	6.5	7.5	---	---	---	22.0	15.5	19.0
MONTH				11.0	.0	3.5	16.5	4.0	9.0	26.0	5.0	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	24.0	15.5	19.5	24.5	19.0	21.5	24.5	17.0	21.0	24.0	20.0	22.0
2	21.5	15.5	19.0	27.5	20.0	23.0	22.5	19.0	21.0	22.5	19.0	21.0
3	24.5	18.0	21.0	28.0	20.5	24.0	23.5	19.0	21.5	22.5	19.0	20.0
4	25.5	18.5	21.5	28.0	20.5	24.5	24.0	19.5	22.0	20.0	18.0	19.5
5	28.0	17.5	23.0	28.0	20.0	24.0	24.5	20.0	22.5	20.5	18.5	19.0
6	29.0	20.5	24.5	---	---	---	23.5	20.5	21.5	21.0	18.5	19.5
7	26.5	18.0	23.0	---	---	---	23.0	20.0	21.0	21.5	18.5	19.5
8	24.0	20.0	22.0	---	---	---	22.5	19.5	21.0	21.5	16.0	18.5
9	23.0	17.5	20.5	---	---	---	24.0	19.0	21.5	20.0	15.5	18.0
10	23.0	17.5	20.5	---	---	---	24.0	20.0	21.5	20.0	16.0	18.5
11	27.0	16.5	21.5	---	---	---	24.0	19.5	21.5	21.5	18.5	20.0
12	22.5	19.0	20.5	---	---	---	23.0	19.0	20.5	22.0	18.0	19.5
13	21.0	18.0	19.0	---	---	---	23.5	20.0	21.5	---	---	---
14	23.0	17.0	19.5	---	---	---	22.5	20.5	21.5	21.0	16.0	18.0
15	28.5	19.0	22.5	---	---	---	22.0	19.0	21.0	18.0	14.0	16.0
16	23.5	20.5	22.0	---	---	---	22.0	17.5	19.5	14.5	12.5	14.0
17	27.5	18.0	22.0	22.5	17.5	20.0	21.5	16.5	19.0	15.0	11.0	13.0
18	25.5	16.5	21.5	21.5	17.0	19.5	22.0	16.0	19.0	15.0	12.5	14.0
19	25.5	19.0	22.0	22.0	18.5	20.5	21.5	16.0	18.5	16.0	12.0	14.0
20	21.5	17.0	19.0	22.5	19.5	21.0	22.5	16.5	19.5	15.0	11.5	12.5
21	25.0	17.5	20.5	20.5	18.5	20.0	23.0	18.0	20.5	12.0	9.5	11.0
22	21.5	17.5	19.5	21.0	15.5	18.5	22.5	18.5	21.0	12.5	9.0	10.5
23	24.5	16.5	20.0	23.0	15.5	19.5	24.0	19.5	22.0	13.5	10.0	11.5
24	26.0	19.0	22.0	23.5	17.5	20.5	24.0	19.5	22.5	14.0	11.0	12.0
25	26.0	19.5	22.5	22.0	19.0	20.5	24.0	18.5	21.5	14.5	11.0	12.5
26	24.5	15.5	20.0	21.0	19.0	20.0	23.0	19.0	21.5	15.0	12.0	13.5
27	26.0	16.5	21.0	19.5	16.0	18.0	21.0	19.0	20.0	13.0	10.0	11.0
28	24.0	18.5	21.0	18.5	15.5	16.5	21.0	18.5	19.5	11.0	9.0	10.0
29	27.5	18.5	23.0	20.5	14.5	17.0	22.0	19.0	20.5	12.0	8.5	9.5
30	25.5	20.5	23.5	21.0	15.0	18.0	22.5	20.0	21.0	10.5	8.0	9.0
31	---	---	---	22.5	16.5	19.5	23.5	20.5	22.0	---	---	---
MONTH	29.0	15.5	21.0				24.5	16.0	21.0			

04143500 NORTH BRANCH KAWKAWLIN RIVER NEAR KAWKAWLIN, MI

LOCATION.--Lat 43°40'05", long 83°58'13", in SE¼ SE¼ sec.27, T.15 N., R.4 E., Bay County, Hydrologic Unit 04080102, on left bank 50 ft (15 m) upstream from bridge on Beaver Road, 1.7 mi (2.7 km) northwest of Kawkawlin, and 2.4 mi (3.9 km) upstream from mouth.

DRAINAGE AREA.--101 mi^2 (262 km^2).

PERIOD OF RECORD.--March 1951 to current year.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 26, 1951, nonrecording gage at site 70 ft (21 m) downstream, and Sept. 27, 1951, to Sept. 30, 1960, water-stage recorder at present site, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records fair except those for the winter period, which are poor. Some diversion above station for irrigation. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--30 years, 58.6 ft^3/s (1.660 m^3/s), 7.88 in/yr (200 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,610 ft^3/s (45.6 m^3/s) May 18, 1974, gage height, 10.92 ft (3.328 m); no flow at times in each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,010 ft^3/s (28.6 m^3/s) Feb. 25, gage height, 9.44 ft (2.877 m); no flow Aug. 1-3, 11-14, 18-28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	29	30	23	16	495	61	725	14	30	.00	4.0
2	21	28	32	20	17	427	63	584	11	20	.00	2.0
3	19	27	36	19	14	417	70	425	9.1	14	.00	1.0
4	39	27	31	19	14	341	77	292	8.5	8.8	.50	.50
5	36	26	33	19	14	273	70	199	8.0	9.3	.30	50
6	25	23	39	19	14	206	59	145	7.5	11	.02	37
7	20	20	55	20	14	172	54	109	7.0	8.8	.10	28
8	17	19	80	20	14	146	54	90	6.5	6.4	10	23
9	18	18	74	19	15	147	124	74	6.0	6.1	.30	21
10	23	18	60	19	15	132	133	72	5.5	6.5	.04	17
11	23	23	40	19	16	121	348	201	5.0	3.9	.00	15
12	19	27	34	19	17	115	450	225	5.5	3.1	.00	12
13	15	28	31	19	18	117	363	339	6.5	2.8	.00	11
14	14	36	36	18	20	115	287	510	7.5	2.7	.00	9.5
15	29	39	45	17	23	106	230	459	10	2.2	1.0	8.5
16	37	38	80	17	26	97	205	337	30	2.1	7.0	6.7
17	77	36	123	16	30	90	232	226	25	2.0	.50	154
18	114	34	76	16	35	80	225	157	15	1.9	.00	152
19	88	39	61	16	50	78	179	114	10	1.5	.00	125
20	105	40	41	16	150	69	148	86	9.3	1.0	.00	133
21	118	40	32	16	710	59	121	70	15	.51	.00	154
22	127	39	30	16	700	50	94	57	20	.38	.00	204
23	124	38	28	17	900	43	82	46	19	.25	.00	167
24	107	35	27	17	914	40	75	39	16	.16	.00	132
25	89	33	26	17	961	38	67	33	13	.66	.00	114
26	71	34	25	17	902	38	68	26	21	.63	.00	146
27	56	29	24	17	710	40	94	22	38	.14	.00	163
28	45	27	24	17	584	42	145	19	37	.03	.00	135
29	38	28	24	17	---	43	197	18	26	2.0	.06	110
30	32	31	25	15	---	51	466	18	34	1.5	.40	121
31	29	---	26	15	---	59	---	16	---	.10	6.0	---
TOTAL	1608	909	1328	551	6913	4247	4841	5733	445.9	150.46	26.22	2256.20
MEAN	51.9	30.3	42.8	17.8	247	137	161	185	14.9	4.85	.85	75.2
MAX	127	40	123	23	961	495	466	725	38	30	10	204
MIN	14	18	24	15	14	38	54	16	5.0	.03	.00	.50
CFSM	.51	.30	.42	.18	2.45	1.36	1.59	1.83	.15	.05	.008	.75
IN.	.59	.33	.49	.20	2.55	1.56	1.78	2.11	.16	.06	.01	.83

CAL YR 1980 TOTAL 16056.98 MEAN 43.9 MAX 289 MIN .00 CFSM .44 IN 5.91
WTR YR 1981 TOTAL 29008.78 MEAN 79.5 MAX 961 MIN .00 CFSM .79 IN 10.68

04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW¼ sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi (1.6 km) west of Linden.

DRAINAGE AREA.--81.2 mi² (210.3 km²).

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 844.96 ft (257.544 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by dam at Linden since 1967. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 59.2 ft³/s (1.677 m³/s), 9.90 in/yr (251 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft³/s (13.5 m³/s) Apr. 22, 1975, gage height, 7.43 ft (2.265 m); minimum, 0.74 ft³/s (0.021 m³/s) May 22, 23, 1971; minimum gage height, 2.82 ft (0.860 m) Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 196 ft³/s (5.52 m³/s) Feb. 25, gage height, 5.90 ft (1.798 m); minimum, 4.2 ft³/s (0.12 m³/s) Dec. 23, gage height, 3.20 ft (0.975 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	40	26	33	26	182	64	93	32	18	13	15
2	40	39	24	34	25	168	63	92	36	9.3	12	17
3	40	38	23	33	25	126	62	91	36	9.6	12	20
4	40	38	22	33	24	145	72	91	38	9.8	12	68
5	38	38	22	35	24	146	76	90	36	11	11	108
6	36	42	24	35	24	139	79	84	35	11	11	104
7	34	43	29	35	23	118	87	77	34	11	11	94
8	30	43	41	35	23	113	89	73	35	11	11	88
9	29	41	72	35	23	105	92	71	35	10	12	85
10	29	40	77	35	23	85	91	74	33	9.9	12	81
11	28	38	72	35	23	81	96	80	32	9.7	12	65
12	29	37	74	35	24	80	98	72	31	9.2	15	57
13	29	34	74	35	25	80	100	61	31	11	14	55
14	29	33	74	34	25	79	126	66	33	10	14	57
15	30	32	73	34	25	78	120	85	32	9.9	15	56
16	30	32	73	33	30	77	117	91	25	9.3	15	56
17	31	30	73	33	70	75	117	94	22	9.1	14	61
18	32	30	70	33	102	71	117	95	22	8.8	14	60
19	32	29	69	32	110	67	116	94	22	8.6	13	56
20	32	28	71	31	120	64	114	93	21	8.9	13	54
21	38	28	62	30	136	61	104	91	21	10	12	54
22	39	28	43	26	154	59	101	86	24	10	12	66
23	38	28	8.0	24	167	51	104	75	23	10	12	62
24	39	28	17	23	186	48	104	71	23	9.6	11	59
25	41	28	28	23	196	48	104	70	22	9.1	11	57
26	40	27	26	25	195	51	101	69	22	11	11	57
27	40	27	26	28	192	54	92	70	21	10	11	61
28	45	27	25	28	190	53	92	62	20	14	12	61
29	47	27	26	27	---	53	94	31	20	15	9.9	59
30	43	27	29	27	---	57	94	31	20	14	14	62
31	41	---	32	26	---	62	---	31	---	14	14	---
TOTAL	1108	1000	1405.0	965	2210	2676	2886	2354	837	331.8	385.9	1855
MEAN	35.7	33.3	45.3	31.1	78.9	86.3	96.2	75.9	27.9	10.7	12.4	61.8
MAX	47	43	77	35	196	182	126	95	38	18	15	108
MIN	28	27	8.0	23	23	48	62	31	20	8.6	9.9	15
CFSM	.44	.41	.56	.38	.97	1.06	1.19	.94	.34	.13	.15	.76
IN.	.51	.46	.64	.44	1.01	1.23	1.32	1.08	.38	.15	.18	.85

CAL YR 1980 TOTAL 18918.0 MEAN 51.7 MAX 180 MIN 8.0 CFSM .64 IN 8.67
WTR YR 1981 TOTAL 18013.7 MEAN 49.4 MAX 196 MIN 8.0 CFSM .61 IN 8.25

04144000 SHIAWASSEE RIVER AT BYRON, MI

LOCATION.--Lat 42°49'25", long 83°56'45", in NE¼ NE¼ sec.23, T.5 N., R.4 E., Shiawassee County, Hydrologic Unit 04080203, on left bank at upstream side of highway bridge at Byron, 0.3 mi (0.5 km) downstream from milldams which are just upstream from South Branch Shiawassee River.

DRAINAGE AREA.--368 mi² (953 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1144: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 812.00 ft (247.498 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 17, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Water-discharge records good. Low flow slightly regulated at times by mills above station.

AVERAGE DISCHARGE.--34 years, 248 ft³/s (7.023 m³/s), 9.15 in/yr (232 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,880 ft³/s (110 m³/s) Apr. 22, 1975, gage height, 15.25 ft (4.648 m); minimum, 19 ft³/s (0.54 m³/s), Aug. 16, 1965; minimum gage height, 3.55 ft (1.082 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,340 ft³/s (37.9 m³/s) Feb. 20, gage height, 9.60 ft (2.926 m); minimum, 29 ft³/s (0.82 m³/s) Aug. 18, gage height, 4.08 ft (1.244 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	214	157	160	131	135	842	323	427	131	95	75	92
2	205	150	183	130	135	719	302	407	101	94	67	92
3	205	145	209	125	135	622	273	382	95	82	61	103
4	220	176	227	120	135	509	285	361	109	70	61	249
5	221	227	220	120	130	465	312	349	116	61	59	339
6	217	242	208	110	130	451	324	335	113	58	55	502
7	213	246	224	110	130	434	310	317	109	56	54	553
8	189	243	270	105	130	411	290	261	129	45	56	529
9	169	216	339	105	130	381	302	218	135	47	57	372
10	171	201	394	105	130	351	314	214	132	50	56	260
11	167	196	472	105	130	325	357	416	124	53	59	221
12	161	191	463	105	130	303	429	509	119	51	56	199
13	150	181	415	105	135	288	547	613	124	56	56	180
14	151	166	361	105	140	265	683	657	141	59	58	122
15	151	158	300	110	140	237	676	641	185	57	63	177
16	168	155	270	120	214	227	692	560	267	54	63	171
17	192	150	260	135	468	226	691	502	195	50	59	174
18	195	148	302	155	874	189	611	462	158	49	43	162
19	192	151	240	180	1130	201	541	419	128	50	37	165
20	183	149	171	210	1300	200	494	383	113	61	45	171
21	173	146	176	205	1300	198	436	359	103	59	52	163
22	162	143	155	195	1300	190	348	316	112	58	56	272
23	154	142	148	175	1300	187	300	271	127	57	56	281
24	151	142	139	170	1230	189	359	247	136	55	55	280
25	155	145	135	156	1180	186	413	235	127	53	55	246
26	158	147	130	153	1130	192	416	229	116	54	56	217
27	163	147	124	150	1060	247	380	201	106	57	60	228
28	165	147	115	145	985	387	376	181	99	61	68	251
29	158	158	116	145	---	349	398	173	94	80	79	256
30	156	160	127	140	---	356	422	160	94	84	85	295
31	158	---	132	140	---	349	---	144	---	76	96	---
TOTAL	5487	5125	7185	4265	15466	10476	12604	10949	3838	1892	1858	7322
MEAN	177	171	232	138	552	338	420	353	128	61.0	59.9	244
MAX	221	246	472	210	1300	842	692	657	267	95	96	553
MIN	150	142	115	105	130	186	273	144	94	45	37	92
CFSM	.48	.47	.63	.38	1.50	.92	1.14	.96	.35	.17	.16	.66
IN.	.55	.52	.73	.43	1.56	1.06	1.27	1.11	.39	.19	.19	.74

CAL YR 1980 TOTAL 92966 MEAN 254 MAX 1130 MIN 64 CFSM .69 IN 9.40
WTR YR 1981 TOTAL 86467 MEAN 237 MAX 1300 MIN 37 CFSM .64 IN 8.74

04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Water years 1962 to current year.

INSTRUMENTATION.--Temperature recorder since March 1962.

REMARKS.--Interruptions in the record were due to the probe covered with silt. No records available for periods Nov. 10 to Dec. 17, May 27 to July 15.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 29.0°C June 28, 1971, July 9, 10, 1974, July 31, 1975; minimum 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 25.5 July 18, 19; minimum recorded, 0.5°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	16.5	15.5	5.0	4.5					---	---	2.5	2.0
2	16.5	16.0	5.0	4.5					---	---	2.5	2.5
3	14.0	13.0	6.0	5.0					---	---	2.5	2.0
4	13.0	11.5	7.0	6.5					---	---	2.0	2.0
5	11.0	10.5	7.0	6.5					---	---	2.0	2.0
6	10.5	9.5	6.5	5.5					---	---	3.0	2.5
7	10.0	9.0	---	6.5					---	---	3.0	2.5
8	11.5	10.0	---	7.5					---	---	3.0	2.5
9	11.5	10.5	---	7.5					---	---	4.0	3.0
10	11.0	10.0	---	---					---	---	4.5	4.0
11	11.5	10.5	---	---					---	---	4.5	4.0
12	10.5	8.5	---	---					---	---	5.5	3.5
13	9.0	8.0	---	---					---	---	5.5	5.0
14	8.0	7.0	---	---					---	---	5.5	3.5
15	7.5	6.5	---	---					---	---	6.5	4.5
16	8.0	7.5	---	---					---	---	6.5	4.5
17	9.5	8.0	---	---					.5	.5	6.0	4.5
18	10.5	10.0	---	---					.5	.5	6.0	4.5
19	10.5	9.0	---	---					.5	.5	4.5	3.5
20	9.0	8.0	---	---					.5	.5	3.5	3.5
21	8.0	7.5	---	---					.5	.5	5.0	3.5
22	8.0	6.5	---	---					.5	.5	7.0	4.5
23	7.0	6.0	---	---					1.5	.5	---	---
24	7.5	6.5	---	---					1.5	1.5	---	---
25	7.5	7.5	---	---					1.5	1.5	---	---
26	7.5	5.5	---	---					1.5	1.5	---	---
27	5.5	5.0	---	---					1.5	1.5	---	---
28	5.0	4.5	---	---					1.5	1.5	---	---
29	5.0	4.0	---	---					---	---	---	---
30	4.0	3.5	---	---					---	---	---	---
31	5.0	4.5	---	---					---	---	---	---
MONTH	16.5	3.5										

04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	---	---			---	---	23.5	20.0	23.5	21.5
2	10.5	9.0	---	---			---	---	24.0	21.5	23.5	21.5
3	11.0	10.0	---	---			---	---	24.0	22.5	21.5	20.0
4	12.0	11.5	---	---			---	---	25.0	22.5	20.5	19.0
5	12.0	7.0	---	---			---	---	25.0	22.5	19.0	19.0
6	7.0	5.0	16.5	14.0			---	---	24.5	22.5	19.0	18.5
7	9.0	6.0	16.0	13.0			---	---	25.0	22.5	19.5	18.5
8	10.0	8.5	16.5	13.5			---	---	24.5	22.5	19.5	19.0
9	12.0	10.0	17.5	15.5			---	---	23.5	21.5	19.5	18.0
10	11.5	9.5	17.5	13.0			---	---	24.0	22.0	19.0	17.5
11	12.5	11.5	13.5	10.5			---	---	24.0	22.5	21.0	19.0
12	12.5	9.5	12.5	10.0			---	---	23.5	21.0	22.0	20.5
13	9.5	9.0	15.0	13.0			---	---	24.0	22.0	22.0	20.5
14	10.0	9.5	15.0	14.5			---	---	24.0	22.5	21.5	21.0
15	10.0	8.5	---	---			---	---	22.5	22.0	21.0	19.0
16	10.0	9.0	---	---			24.5	21.5	22.0	20.5	20.5	17.5
17	---	---	---	---			25.0	22.0	21.5	18.5	17.5	16.0
18	---	---	---	---			25.5	22.5	21.0	18.0	16.0	15.0
19	---	---	---	---			25.5	24.0	21.5	18.0	16.0	14.5
20	---	---	---	---			24.5	23.5	22.0	18.5	16.0	14.5
21	---	---	---	---			24.5	22.5	22.0	20.0	15.0	13.0
22	---	---	---	---			23.5	20.5	22.0	19.5	13.0	12.0
23	---	---	---	---			23.0	20.0	22.5	20.0	13.0	11.5
24	---	---	---	---			23.5	20.5	22.5	21.0	13.0	11.5
25	---	---	---	---			24.5	21.0	22.0	19.0	13.0	13.0
26	---	---	---	---			24.5	23.0	22.0	20.0	15.5	13.0
27	---	---	---	---			23.0	21.0	22.0	21.0	16.5	15.5
28	---	---	---	---			22.0	19.0	22.0	21.0	16.5	14.5
29	---	---	---	---			20.5	18.0	22.5	21.5	15.5	14.0
30	---	---	---	---			21.5	18.5	22.5	21.0	14.0	13.0
31	---	---	---	---			22.0	19.0	22.5	21.5	---	---
MONTH									25.0	18.0	23.5	11.5

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW¼ sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi (2.4 km) north of Owosso.

DRAINAGE AREA.--538 mi^{2} (1,393 km^{2}).

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft (215.570 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 15, 1933, at site 1.5 mi (2.4 km) upstream at datum 5.46 ft (1.664 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated below about 800 ft^{3}/s (22.7 m^{3}/s) by powerplant at Shiawasseetown prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 327 ft^{3}/s (9.261 m^{3}/s), 8.25 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,240 ft^{3}/s (177 m^{3}/s) Apr. 6, 1947, gage height, 10.35 ft (3.155 m); minimum, 0.2 ft^{3}/s (0.006 m^{3}/s) July 27, 1934, gage height, 1.12 ft (0.341 m); minimum daily, 2.0 ft^{3}/s (0.057 m^{3}/s) July 28, 1934.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,500 ft^{3}/s (42.5 m^{3}/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft^{3}/s)	(m^{3}/s)	(ft)	(m)			(ft^{3}/s)	(m^{3}/s)	(ft)	(m)
Feb. 19	0400	*3,300	93.5	*7.67	2.338	May 11	2000	2,400	68.0	6.63	2.021
Apr. 14	1300	2,400	68.0	6.63	2.021						

Minimum discharge, 45 ft^{3}/s (1.27 m^{3}/s) Aug. 21-24, 26, gage height, 2.17 ft (0.661 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	272	173	161	160	170	1390	452	555	196	126	91	93
2	231	171	204	160	180	1180	416	536	178	128	86	95
3	231	166	223	155	170	978	380	500	159	89	84	89
4	231	159	263	150	165	820	359	464	137	95	80	248
5	239	171	289	145	160	695	366	436	140	95	74	484
6	242	220	275	140	160	635	376	416	149	89	70	504
7	239	248	420	140	160	595	380	392	154	76	70	630
8	231	257	680	140	160	560	363	352	188	72	70	645
9	209	248	840	140	160	524	400	320	194	68	64	565
10	186	223	720	140	160	496	444	384	199	62	68	380
11	181	207	645	140	165	460	615	1800	188	58	68	266
12	176	199	630	140	165	420	820	2060	176	58	68	223
13	171	188	575	140	170	388	1070	1500	183	101	68	194
14	166	183	492	140	190	363	2010	1260	324	66	66	173
15	166	166	432	140	240	331	1750	1130	448	58	72	126
16	183	154	345	160	450	289	1310	996	366	64	66	159
17	234	147	292	175	1320	285	1160	820	396	62	66	207
18	257	144	278	190	1930	285	1030	705	306	60	64	188
19	254	140	300	210	2470	242	852	610	239	56	60	171
20	237	144	230	230	2280	239	740	536	201	58	52	144
21	234	144	215	230	2170	239	650	484	181	62	47	181
22	212	142	195	225	2120	237	560	452	178	64	45	251
23	196	140	185	215	2050	217	550	384	173	60	45	366
24	188	142	175	200	1990	223	504	334	181	60	47	338
25	194	140	170	190	1780	223	536	324	191	60	47	310
26	191	140	160	180	1610	237	560	317	183	64	45	296
27	191	144	150	175	1490	260	536	299	164	60	54	524
28	191	149	140	175	1470	327	504	269	144	112	68	373
29	188	149	140	175	---	472	524	242	137	84	95	317
30	178	156	155	175	---	440	545	228	133	78	97	524
31	176	---	160	170	---	468	---	214	---	86	89	---
TOTAL	6475	5154	10139	5245	25705	14518	20762	19319	6186	2331	2086	9064
MEAN	209	172	327	169	918	468	692	623	206	75.2	67.3	302
MAX	272	257	840	230	2470	1390	2010	2060	448	128	97	645
MIN	166	140	140	140	160	217	359	214	133	56	45	89
CFSM	.39	.32	.61	.31	1.71	.87	1.29	1.16	.38	.14	.13	.56
IN.	.45	.36	.70	.36	1.78	1.00	1.44	1.34	.43	.16	.14	.63

CAL YR 1980 TOTAL 120733 MEAN 330 MAX 1430 MIN 68 CFSM .61 IN 8.35
WTR YR 1981 TOTAL 126984 MEAN 348 MAX 2470 MIN 45 CFSM .65 IN 8.78

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi (1.9 km) east of Fergus, 1.8 mi (2.9 km) upstream from Bear Creek, and 14 mi (22 km) above mouth.

DRAINAGE AREA.--637 mi² (1,650 km²).

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft (178.552 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period and those during July and August, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 414 ft³/s (11.72 m³/s), 8.83 in/yr (224 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft³/s (212 m³/s) Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.44 ft (4.706 m), present datum, Mar. 29, 1960; minimum discharge, 27 ft³/s (0.76 m³/s) Aug. 8, 1966; minimum gage height, 1.53 ft (0.466 m) Aug. 23, 24, 25, 26, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,000 ft³/s (113 m³/s) Feb. 19, gage height, 13.88 ft (4.231 m), backwater from ice; minimum daily discharge, 72 ft³/s (2.04 m³/s) July 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	319	224	198	210	220	1590	485	651	229	131	90	146
2	307	217	233	205	220	1340	455	635	213	125	94	147
3	285	208	365	200	215	1100	416	599	197	125	93	150
4	295	204	447	195	215	933	388	556	177	107	92	180
5	291	201	503	190	210	839	385	518	154	105	90	406
6	291	203	390	180	210	742	386	491	153	104	88	536
7	291	251	465	180	210	703	389	460	155	99	86	581
8	285	273	868	180	210	665	388	422	156	93	84	695
9	277	281	1260	180	210	621	420	386	193	89	82	680
10	249	279	963	180	210	607	434	419	186	88	80	603
11	228	261	791	180	215	575	596	2150	184	80	78	430
12	222	243	742	180	225	532	782	3260	173	75	76	354
13	215	235	698	180	240	496	984	2080	169	74	75	316
14	211	233	630	180	270	452	1520	1460	237	104	81	291
15	219	226	550	180	320	426	2180	1230	483	87	99	270
16	235	208	470	180	400	385	1490	1090	392	75	97	220
17	347	196	400	180	1140	368	1210	950	334	80	90	305
18	520	192	360	200	3000	353	1080	821	341	80	88	339
19	397	187	380	215	3900	341	947	739	262	76	88	309
20	339	183	310	230	3600	301	845	664	218	72	89	278
21	325	181	280	240	2490	294	764	600	197	74	86	259
22	325	183	260	240	2320	297	701	539	183	80	82	332
23	289	184	240	240	2300	293	680	486	173	81	77	412
24	265	184	225	225	2240	271	666	416	164	78	77	493
25	269	187	215	205	1960	273	620	381	162	78	78	461
26	283	187	205	205	1690	278	638	363	167	78	79	456
27	267	187	195	210	1530	309	643	349	162	80	83	941
28	259	190	185	215	1650	320	619	328	148	96	96	869
29	251	193	180	225	---	402	636	295	135	139	131	590
30	239	193	195	225	---	500	662	270	134	102	152	530
31	226	---	205	220	---	468	---	251	---	93	152	---
TOTAL	8821	6374	13408	6255	31620	17074	22409	23859	6231	2848	2833	12579
MEAN	285	212	433	202	1129	551	747	770	208	91.9	91.4	419
MAX	520	281	1260	240	3900	1590	2180	3260	483	139	152	941
MIN	211	181	180	180	210	271	385	251	134	72	75	146
CFSM	.45	.33	.68	.32	1.77	.87	1.17	1.21	.33	.14	.14	.66
IN.	.52	.37	.78	.37	1.85	1.00	1.31	1.39	.36	.17	.17	.73

CAL YR 1980 TOTAL 141629 MEAN 387 MAX 1570 MIN 105 CFSM .61 IN 8.27
WTR YR 1981 TOTAL 154311 MEAN 423 MAX 3900 MIN 72 CFSM .66 IN 9.01

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi (3.2 km) west of Lapeer.

DRAINAGE AREA.--55.3 mi² (143.2 km²).

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952(M). WDR MI-78: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft (245.605 m) National Geodetic Vertical Datum of 1929. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--49 years, 30.0 ft³/s (0.850 m³/s), 7.37 in/yr (187 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) Apr. 6, 1947, gage height, 19.87 ft (6.056 m), from floodmark, from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 160 ft³/s (4.53 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 19	2000	*276	7.82	*17.22	5.249	Sep. 7	1400	183	5.18	16.79	5.118

Minimum discharge, 5.6 ft³/s (0.16 m³/s) Aug. 26, 27, gage height, 15.17 ft (4.624 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	21	18	15	17	120	42	42	20	9.3	10	10
2	18	20	20	14	17	106	44	26	18	9.0	10	9.6
3	18	22	20	14	17	95	44	23	17	9.0	9.6	10
4	19	32	22	14	17	86	45	22	16	9.0	9.3	72
5	19	42	22	14	17	78	41	19	14	12	8.6	96
6	18	45	22	14	17	69	38	17	13	12	8.6	139
7	17	49	31	14	17	62	36	12	13	12	8.2	180
8	17	56	39	14	17	57	33	11	12	12	8.6	164
9	16	51	44	14	17	54	42	10	13	12	8.6	122
10	14	42	48	14	17	50	40	17	12	12	8.2	88
11	14	44	49	14	20	47	49	55	12	11	7.9	69
12	13	47	51	15	23	46	53	62	11	10	7.2	56
13	13	42	47	16	27	44	60	118	11	10	6.8	47
14	13	36	38	17	31	42	78	153	17	11	6.8	39
15	16	31	33	17	38	42	82	123	26	10	7.6	34
16	17	26	29	17	53	41	87	92	23	10	7.9	30
17	18	23	26	16	79	38	90	80	21	9.6	7.6	34
18	18	22	23	16	130	36	86	73	19	9.3	7.6	34
19	18	20	21	16	219	33	79	66	17	9.0	7.2	32
20	18	19	21	16	249	30	70	57	14	8.6	6.8	30
21	19	19	20	16	229	29	60	42	14	8.2	6.5	30
22	19	18	19	16	200	28	54	32	14	7.9	6.2	36
23	21	18	18	16	191	27	54	28	15	7.6	6.2	37
24	22	17	18	16	179	26	50	26	14	7.2	6.2	41
25	23	17	17	16	180	26	50	27	14	6.8	5.9	45
26	24	16	17	16	172	26	53	27	13	7.2	5.9	46
27	25	16	16	16	153	28	53	27	12	7.6	5.9	46
28	24	17	16	17	139	28	57	26	11	9.6	6.8	40
29	23	17	16	17	---	32	59	26	10	11	6.8	38
30	22	18	16	17	---	36	54	24	9.6	11	7.2	39
31	22	---	15	17	---	39	---	22	---	10	6.8	---
TOTAL	577	863	812	481	2482	1501	1683	1385	445.6	300.9	233.5	1693.6
MEAN	18.6	28.8	26.2	15.5	88.6	48.4	56.1	44.7	14.9	9.71	7.53	56.5
MAX	25	56	51	17	249	120	90	153	26	12	10	180
MIN	13	16	15	14	17	26	33	10	9.6	6.8	5.9	9.6
CFSM	.34	.52	.47	.28	1.60	.88	1.01	.81	.27	.18	.14	1.02
IN.	.39	.58	.55	.32	1.67	1.01	1.13	.93	.30	.20	.16	1.14

CAL YR 1980 TOTAL 11347.8 MEAN 31.0 MAX 165 MIN 3.8 CFSM .56 IN 7.63
WTR YR 1981 TOTAL 12457.6 MEAN 34.1 MAX 249 MIN 5.9 CFSM .62 IN 8.38

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE¼ NE¼ sec. 36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 miles (4.8 km) east of Columbiaville, and 3.2 miles (5.1 km) upstream from confluence of North and South Branches.

DRAINAGE AREA.--221 mi² (572 km²).

PERIOD OF RECORD.--March 1980 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 765 ft (233 m), from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the period.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,190 ft³/s (33.7 m³/sec) Feb. 19, 1981, gage height, 6.85 ft (2.088 m), backwater from ice; minimum, 18 ft³/s (0.51 m³/s) Aug. 25, 26, 27, 1981; minimum gage height, 1.36 ft (0.415 m) Aug. 26, 27, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,190 ft³/s (33.7 m³/s) Feb. 19, gage height, 6.85 ft (2.088 m), backwater from ice; minimum, 18 ft³/s (0.51 m³/s) Aug. 25, 26, 27; minimum gage height, 1.36 ft (0.415 m) Aug. 26, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	92	90	74	76	613	200	222	104	53	53	81
2	116	90	103	74	79	527	189	191	97	50	46	91
3	111	89	105	74	80	435	179	164	96	45	40	81
4	118	90	120	74	80	359	177	147	89	43	38	241
5	140	97	140	74	80	315	187	135	87	58	34	517
6	143	104	165	76	80	276	177	128	87	68	30	560
7	139	113	194	76	80	235	166	119	78	64	32	521
8	120	122	276	76	80	214	155	105	75	56	39	513
9	110	115	363	75	80	210	186	99	78	50	42	452
10	105	110	319	74	80	207	216	115	75	45	38	306
11	97	105	244	73	80	207	242	354	70	40	34	200
12	93	100	218	72	105	200	305	693	64	39	36	155
13	89	95	170	71	100	197	295	669	59	38	30	128
14	91	94	155	70	96	187	411	586	93	38	27	104
15	114	90	140	70	96	180	540	541	366	40	40	86
16	138	90	130	70	100	175	447	449	293	45	41	77
17	153	88	120	70	320	169	386	364	198	42	34	105
18	144	86	110	69	640	156	349	303	150	40	29	132
19	144	84	105	69	1080	148	303	256	125	40	28	122
20	138	82	100	68	1150	139	269	220	102	40	26	105
21	131	81	94	68	1080	136	234	189	87	42	26	97
22	120	80	90	68	1010	135	203	161	89	42	25	142
23	110	80	87	69	959	133	216	148	105	36	22	173
24	114	80	85	70	981	134	244	130	104	35	21	151
25	126	80	83	71	878	135	248	132	93	32	19	139
26	129	80	81	74	792	135	233	130	84	33	18	135
27	115	81	80	80	695	155	225	129	73	36	19	156
28	115	82	79	86	627	168	211	129	64	56	33	170
29	110	85	78	82	---	170	247	125	56	77	41	134
30	100	88	76	78	---	177	243	120	53	71	63	115
31	95	---	74	72	---	197	---	109	---	60	69	---
TOTAL	3688	2753	4274	2267	11584	6824	7683	7362	3194	1454	1073	5989
MEAN	119	91.8	138	73.1	414	220	256	237	106	46.9	34.6	200
MAX	153	122	363	86	1150	613	540	693	366	77	69	560
MIN	89	80	74	68	76	133	155	99	53	32	18	77
CFSM	.54	.42	.62	.33	1.87	1.00	1.16	1.07	.48	.21	.16	.91
IN.	.62	.46	.72	.38	1.95	1.15	1.29	1.24	.54	.24	.18	1.01

WTR YR 1981 TOTAL 58145 MEAN 159 MAX 1150 MIN 18 CFSM .72 IN 9.79

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW¼ sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi (5.6 km) southeast of Otisville.

DRAINAGE AREA.--526 mi² (1,362 km²).

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft (35.6 hm³) at elevation 760.00 ft (231.65 m). The spillway section includes two 90 foot (27.4 m) drum gates with minimum crest elevation of 751 ft (228.9 m), maximum at 755 ft (230.1 m), three 20-foot (6.1 m) radial gates with sill elevation of 745 ft (227.1 m), and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft (220.7 m). Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft (28.2 hm³) Mar. 8, 1956, elevation, 757.4 ft (230.86 m); minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 866,300,000 cu ft (24.3 hm³) Sept. 7, elevation, 756.07 ft (230.45 m); minimum, 443,000,000 cu ft (12.5 hm³) Nov. 25, elevation, 750.50 ft (228.74 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month: Millions of cubic feet	Change in contents during month: Equivalent in ft³/s
Sept. 30	755.13	782	--	--
Oct. 31	755.24	792	+10	+3.7
Nov. 30	750.90	467	-325	-125
Dec. 31	751.71	517	+50	+18.7
CAL YR 1980	--	--	-37	-1.2
Jan. 31	751.92	531	+14	+5.2
Feb. 28	754.46	724	+193	+79.8
Mar. 31	750.90	467	-257	-96.0
Apr. 30	755.55	820	+353	+136
May 31	754.98	768	-52	-19.4
June 30	754.88	759	-9	-3.5
July 31	752.69	585	-174	-65.0
Aug. 31	752.90	600	+15	+5.6
Sept. 30	755.25	792	+192	+74.1
WTR YR 1981	--	--	+10	+0.3

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE¼ sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 15, 1.5 mi (2.4 km) downstream from Holloway Reservoir, 3.5 mi (5.6 km) upstream from Powers-Cullen drain, and 3.8 mi (6.1 km) south of Otisville.

DRAINAGE AREA.--530 mi² (1,373 km²).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft (219.880 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi (2.4 km) above station (see preceding page). Several observations of water temperature were made during the year. City of Flint gage-height telemark at station.

AVERAGE DISCHARGE.--29 years, 296 ft³/s (8.383 m³/s), 7.58 in/yr (193 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft³/s (174 m³/s) Apr. 1, 1960, gage height, 14.97 ft (4.563 m); minimum, 2.1 ft³/s (0.059 m³/s) Oct. 11, 12, 1971, gage height, 1.57 ft (0.479 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,640 ft³/s (74.8 m³/s) Feb. 20, gage height, 12.16 ft (3.706 m); minimum, 18 ft³/s (0.51 m³/s) Dec. 20, gage height, 2.02 ft (0.616 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	454	197	109	138	197	1610	347	614	245	287	56	117
2	367	192	112	141	199	1520	401	624	230	218	53	116
3	286	178	112	143	201	1410	454	596	208	191	53	116
4	298	181	112	144	197	1300	447	546	173	202	53	265
5	296	191	112	143	196	1150	444	497	178	204	61	686
6	235	181	112	144	192	1010	345	457	282	201	88	1160
7	180	347	119	146	189	902	201	381	282	201	103	1570
8	214	413	184	144	188	806	361	340	221	199	160	1680
9	238	361	506	143	186	688	315	299	152	199	186	1510
10	214	354	684	143	189	586	260	347	230	197	184	1260
11	199	352	776	143	197	528	231	726	315	197	154	1010
12	194	350	957	144	196	582	237	1370	255	194	111	820
13	184	349	896	144	197	656	243	1790	255	196	111	698
14	191	347	838	143	201	524	250	2010	243	192	112	622
15	216	345	764	144	213	325	219	1740	173	159	114	604
16	225	345	710	144	379	327	704	1320	168	132	114	556
17	250	412	518	148	425	333	1080	1200	168	130	114	299
18	270	508	157	148	980	337	1130	754	168	130	114	296
19	284	502	159	149	1570	337	972	556	181	130	114	293
20	282	592	146	149	2260	333	812	626	184	130	114	293
21	286	658	167	151	2380	332	710	692	183	130	114	325
22	282	648	92	154	2470	332	646	488	180	130	114	408
23	279	640	52	156	1880	332	596	301	180	130	114	461
24	257	516	77	159	1710	330	596	325	184	128	114	486
25	231	209	93	160	1880	330	580	330	183	128	114	566
26	218	109	104	164	1840	332	562	328	178	111	114	632
27	238	109	111	170	1750	333	536	327	149	93	114	604
28	219	109	116	178	1680	332	534	303	108	95	116	602
29	211	109	125	188	---	332	548	282	194	79	116	574
30	201	109	128	191	---	333	584	269	287	55	116	594
31	189	---	133	191	---	340	---	253	---	55	116	---
TOTAL	7688	9913	9281	4747	24142	18922	15345	20691	6137	4823	3431	19223
MEAN	248	330	299	153	862	610	512	667	205	156	111	641
MAX	454	658	957	191	2470	1610	1130	2010	315	287	186	1680
MIN	180	109	52	138	186	325	201	253	108	55	53	116
MEAN +	252	205	318	158	942	514	648	648	201	90.6	116	715
CFSM +	.48	.39	.60	.30	1.78	.97	1.22	1.22	.38	.17	.22	1.35
IN +	.55	.43	.69	.34	1.85	1.12	1.36	1.41	.42	.20	.25	1.50

CAL YR 1980 TOTAL 121006 MEAN 331 MAX 1400 MIN 52 MEAN + 329 CFSM + .62 IN + 8.46
WTR YR 1981 TOTAL 144343 MEAN 395 MAX 2470 MIN 52 MEAN + 396 CFSM + .75 IN + 10.14

+ Adjusted for change in contents in Holloway Reservoir.

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE¼ NE¼ sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Frances Road, 2.3 mi (3.7 km) upstream from mouth, and 2.0 mi (3.2 km) northeast of Genesee.

DRAINAGE AREA.--34.7 mi^2 (89.9 km^2).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 730 ft (223 m) from topographic map (nearest 10 ft). Prior to June 11, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 20.8 ft^3/s (0.589 m^3/s), 8.14 in/yr (207 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,230 ft^3/s (34.8 m^3/s) revised, Dec. 31, 1972, gage height, 8.68 ft (2.646 m); minimum, 1.2 ft^3/s (0.034 m^3/s) Dec. 1, 1971, result of freezeup, Oct. 3, 1978; minimum gage height, 1.48 ft (0.451 m) July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft^3/s (5.66 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 17	--	350	9.91	*a8.29	2.527	May 11	1300	326	9.23	7.69	2.344
Feb. 23	0800	230	6.51	7.10	2.164	Sept. 4	1500	508	14.4	7.96	2.426
Apr. 14	0900	*700	19.8	8.20	2.499						

a Ice jam.

Minimum discharge, 3.4 ft^3/s (0.096 m^3/s) Aug. 25, gage height, 1.57 ft (0.479 m).

REVISIONS.--The peak discharges and annual maximum (*) for water years 1971-79 have been revised as shown in the following table. They supersede figures shown in the reports for those years.

Water year	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Water year	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
1971	Mar. 15, 1971	0800	*880	24.9	*8.39	2.557	1974	May 17, 1974	0500	*709	20.1	*8.21	2.502
1972	Mar. 22, 1972	0300	378	10.7	7.78	2.371	1975	Mar. 24, 1975	1400	390	11.0	7.80	2.377
1972	Apr. 16, 1972	2400	*542	15.11	*7.99	2.435	1975	Apr. 19, 1975	0600	*989	28.0	*8.49	2.588
1972	Aug. 25, 1972	0200	242	6.85	7.22	2.201	1976	Dec. 15, 1975	0500	548	15.5	8.01	2.441
1973	Dec. 31, 1972	0600	*1230	34.8	*8.68	2.646	1976	Feb. 15, 1976	2400	644	18.2	8.13	2.478
1973	Mar. 14, 1973	2300	245	6.94	7.25	2.210	1976	Feb. 18, 1976	2200	484	13.7	7.93	2.417
1973	Mar. 24, 1973	2400	233	6.60	7.13	2.173	1976	Feb. 21, 1976	2300	411	11.6	7.83	2.387
1973	Mar. 30, 1973	0800	238	6.74	7.18	2.188	1976	Mar. 5, 1976	1100	*772	21.9	*8.28	2.524
1974	Jan. 27, 1974	0900	314	8.89	7.66	2.335	1976	Apr. 25, 1976	1500	310	8.78	7.65	2.332
1974	Mar. 5, 1974	0600	360	10.2	7.75	2.362	1976	May 6, 1976	2400	432	12.2	7.86	2.396
1974	Mar. 9, 1974	0100	203	5.75	6.79	2.070	1976	May 31, 1976	0600	453	12.8	7.89	2.405
1974	Apr. 2, 1974	0600	158	4.47	6.21	1.893	1977	Mar. 29, 1977	0400	*134	3.79	*5.78	1.762
1974	Apr. 4, 1974	0600	390	11.0	7.80	2.377	1978	Mar. 23, 1978	2100	*736	20.8	*8.24	2.512
1974	Apr. 7, 1974	2200	110	3.12	5.24	1.597	1979	Mar. 4, 1979	1900	*1180	33.4	*8.64	2.633

The revised daily discharge in cubic feet per second, for Dec. 31, 1972 is given below. These figures supersede those published in the report for 1973.

Dec. 31, 1972 709

MONTH	TOTAL	MEAN	MAX	MIN	CFSM	IN
December 1972	1,488	48.0	709	13	1.39	1.60
Calendar year 1972	8,013.1	21.9	709	2.5	.63	8.65
Water year 1973	11,941.5	32.7	709	2.9	.95	12.88

04147990 BUTTERNUT CREEK NEAR GENESSE, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	8.4	8.5	6.3	6.0	71	22	26	9.1	5.2	4.9	15
2	11	7.7	12	6.3	6.0	51	20	22	8.4	5.7	4.5	17
3	12	7.5	22	6.2	6.0	42	18	19	8.1	5.5	4.4	10
4	15	7.8	17	6.2	5.8	36	17	17	7.8	9.2	4.3	209
5	14	7.5	12	6.2	5.8	32	16	16	7.4	86	4.1	203
6	12	7.4	14	6.2	5.8	28	14	15	6.9	37	4.1	129
7	11	7.3	61	6.2	5.8	25	13	14	6.5	19	4.1	113
8	10	7.6	96	6.2	5.8	22	12	13	6.8	13	5.7	96
9	9.5	8.0	84	6.2	5.8	22	21	12	6.3	10	5.6	75
10	9.0	8.0	48	6.2	5.8	23	21	38	5.9	8.4	4.9	57
11	8.7	7.6	46	6.1	9.5	23	52	242	5.6	7.4	4.5	44
12	8.6	7.1	40	6.1	9.5	21	45	163	5.9	6.8	4.3	31
13	8.3	7.1	23	6.1	8.5	21	39	97	8.6	6.3	4.2	22
14	8.5	7.4	19	6.1	8.5	19	252	80	24	5.9	4.2	18
15	17	7.6	16	6.0	9.5	19	130	66	24	5.6	5.7	15
16	19	7.4	14	6.0	45	18	97	51	13	5.3	5.5	15
17	24	7.1	12	6.0	230	17	82	38	11	5.2	4.8	43
18	24	7.1	11	6.0	280	15	80	30	8.8	5.0	4.3	43
19	16	7.0	10	6.0	210	15	54	24	7.7	5.2	4.1	29
20	14	7.0	9.5	6.0	144	14	41	21	6.9	5.0	3.8	23
21	14	6.8	9.0	6.0	123	14	32	18	7.2	5.0	3.7	21
22	14	6.8	8.5	6.0	122	14	27	16	8.9	4.8	3.7	49
23	12	6.8	8.0	6.0	183	15	34	14	10	4.5	3.6	31
24	11	7.0	7.8	5.9	114	15	35	14	8.4	4.4	3.6	23
25	12	7.4	7.5	6.0	84	15	31	17	7.4	4.4	3.5	20
26	12	7.1	7.2	6.3	68	16	27	16	6.5	4.4	3.5	29
27	11	7.1	7.0	6.9	54	20	24	14	5.9	4.2	3.6	123
28	10	7.3	6.8	7.0	111	19	24	13	5.5	9.6	5.7	51
29	9.3	8.2	6.5	7.0	---	18	32	11	5.2	10	8.4	35
30	8.8	8.6	6.4	6.7	---	20	30	11	5.0	6.9	7.8	37
31	8.7	---	6.4	6.5	---	23	---	9.6	---	5.6	6.8	---
TOTAL	385.4	222.7	656.1	192.9	1872.1	723	1342	1157.6	258.7	320.5	145.9	1626
MEAN	12.4	7.42	21.2	6.22	66.9	23.3	44.7	37.3	8.62	10.3	4.71	54.2
MAX	24	8.6	96	7.0	280	71	252	242	24	86	8.4	209
MIN	8.3	6.8	6.4	5.9	5.8	14	12	9.6	5.0	4.2	3.5	10
CFSM	.36	.21	.61	.18	1.93	.67	1.29	1.08	.25	.30	.14	1.56
IN.	.41	.24	.70	.21	2.01	.78	1.44	1.24	.28	.34	.16	1.74

CAL YR 1980 TOTAL 6127.1 MEAN 16.7 MAX 122 MIN 2.5 CFSM .48 IN 6.57
WTR YR 1981 TOTAL 8902.9 MEAN 24.4 MAX 280 MIN 3.5 CFSM .70 IN 9.54

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE¼ sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) upstream from bridge on State Highway 21, 1.4 mi (2.3 km) downstream from Black Creek, and 3.3 mi (5.3 km) west of Davison.

DRAINAGE AREA.--99.4 mi² (257.4 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft (227.804 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those below 100 cfs during January and February, which are fair. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--16 years, 68.4 ft³/s (1.937 m³/s), 9.34 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Apr. 21, 1975, gage height, 11.32 ft (3.450 m); minimum, 2.5 ft³/s (0.071 m³/s) Sept. 10, 1978; minimum gage height, 2.69 ft (0.820 m) Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft³/s (9.91 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 18	0300	736	20.8	9.83	2.996	May 11	1900	471	13.3	8.51	2.594
Apr. 14	1500	422	12.0	8.10	2.469	Sep. 5	0400	*938	26.6	*10.37	3.161

Minimum discharge, 3.5 ft³/s (0.099 m³/s) Aug. 25, gage height, 2.81 ft (0.856 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	33	29	25	28	202	96	104	35	19	13	34
2	28	31	44	25	29	169	95	109	29	17	10	27
3	32	31	44	25	28	137	88	91	22	18	8.9	20
4	43	31	53	25	28	141	110	69	23	34	7.9	421
5	36	27	56	25	27	137	105	58	25	50	7.4	735
6	34	24	61	25	27	150	96	55	24	30	6.6	427
7	33	24	133	25	26	138	70	52	23	17	6.0	391
8	30	26	176	24	26	125	64	49	24	14	19	380
9	27	25	236	24	26	84	125	48	26	13	17	292
10	26	26	175	24	25	79	104	76	26	11	10	210
11	24	26	148	24	35	76	180	345	25	9.2	9.2	143
12	23	26	132	24	40	74	224	414	22	8.2	8.9	115
13	23	26	93	24	36	73	159	351	22	23	7.9	78
14	25	26	69	24	37	68	343	261	55	13	8.2	71
15	34	26	60	24	39	67	322	216	57	11	13	57
16	37	25	50	24	110	65	206	185	55	9.9	9.2	49
17	48	24	42	24	490	63	171	182	65	8.9	8.2	66
18	53	24	36	23	643	60	161	125	60	7.9	8.2	61
19	51	24	33	23	484	58	146	107	37	7.4	7.4	58
20	48	24	31	23	512	57	132	78	30	8.5	6.6	56
21	48	24	30	24	483	55	112	72	25	15	5.5	52
22	36	23	29	24	389	53	76	63	35	8.5	5.3	106
23	29	23	28	24	448	51	91	56	40	7.1	4.8	84
24	33	24	28	25	396	45	84	51	34	6.9	4.4	91
25	49	25	27	25	342	50	89	50	30	5.8	4.4	93
26	44	25	26	28	328	60	97	48	27	5.8	4.2	85
27	38	25	26	30	279	63	92	47	25	6.9	4.8	142
28	36	27	26	33	248	69	102	46	22	24	11	116
29	35	28	26	31	---	83	97	42	21	17	12	71
30	34	28	25	29	---	99	97	40	20	18	21	76
31	34	---	25	27	---	107	---	37	---	16	16	---
TOTAL	1106	781	1997	784	5609	2758	3934	3527	964	461.0	286.0	4607
MEAN	35.7	26.0	64.4	25.3	200	89.0	131	114	32.1	14.9	9.23	154
MAX	53	33	236	33	643	202	343	414	65	50	21	735
MIN	23	23	25	23	25	45	64	37	20	5.8	4.2	20
CFSM	.36	.26	.65	.26	2.01	.90	1.32	1.15	.32	.15	.09	1.55
IN.	.41	.29	.75	.29	2.10	1.03	1.47	1.32	.36	.17	.11	1.72

CAL YR 1980 TOTAL 22641.0 MEAN 61.9 MAX 362 MIN 10 CFSM .62 IN 8.47
WTR YR 1981 TOTAL 26814.0 MEAN 73.5 MAX 735 MIN 4.2 CFSM .74 IN 10.03

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NE¼ SW¼ sec.10, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft (8 m) downstream from culvert on extension of Arapaho Street, 5.1 mi (8.2 km) upstream from mouth, and 3.5 mi (5.6 km) east of Flint.

DRAINAGE AREA.--6.43 mi² (16.65 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.56 ft (227.856 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 4.68 ft³/s (0.133 m³/s), 9.88 in/yr (251 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 285 ft³/s (8.07 m³/s) Apr. 19, 1975, gage height, 7.66 ft (2.335 m); no flow on many days during 1970, 1973-80.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*).

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 17	--	120	3.40	[a]5.12	1.561	Aug. 8	1800	89	2.52	3.81	1.161
Apr. 14	0700	125	3.54	4.55	1.387	Sep. 4	1700	*228	6.46	*6.67	2.033
May 11	1000	155	4.39	5.20	1.585						

[a] ice jam.

Minimum discharge, 0.06 ft³/s (0.002 m³/s) July 11, 12, gage height, 0.80 ft (0.244 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.1	.83	.65	.45	.80	17	4.8	2.9	.70	.12	.20	2.5
2	2.4	.79	7.9	.45	.70	9.8	3.2	2.4	.65	.18	.18	1.2
3	3.3	.69	7.1	.45	.65	7.4	2.6	2.1	.62	.25	.16	1.1
4	5.3	.85	1.5	.40	.60	5.3	8.1	1.9	.60	1.5	.16	184
5	1.7	.74	1.3	.40	.60	4.7	5.7	1.7	.54	11	.14	109
6	1.1	.68	2.4	.40	.60	3.6	3.0	1.5	.51	.30	.15	40
7	1.1	.71	29	.40	.55	3.5	2.4	1.4	.45	.17	.16	20
8	.99	.96	41	.40	.55	2.8	2.1	1.3	.74	.11	27	9.3
9	.84	.71	37	.40	.50	2.8	30	1.2	.79	.09	18	3.3
10	.74	.68	11	.40	.50	3.0	11	21	.51	.08	.74	1.9
11	.76	.62	4.3	.35	5.0	2.8	46	110	.41	.07	.52	1.3
12	.77	.59	2.8	.35	4.0	2.7	32	49	.37	.07	.43	1.0
13	.69	.59	2.4	.35	3.0	2.7	25	20	.58	20	.37	.89
14	1.4	.74	2.0	.35	3.5	2.4	90	10	24	.51	.35	.96
15	2.5	.68	1.7	.35	3.2	2.4	32	8.7	3.7	.22	1.8	.81
16	2.5	.59	1.5	.35	40	2.4	15	6.5	.79	.17	.52	1.3
17	2.2	.59	1.3	.35	85	2.1	10	4.2	.56	.13	.34	15
18	1.9	.59	1.2	.35	110	1.7	6.9	3.1	.46	.12	.29	3.5
19	1.0	.56	1.1	.35	74	1.6	4.9	2.6	.38	.11	.27	1.7
20	.84	.56	1.0	.35	43	1.7	3.8	2.1	.33	.92	.25	1.2
21	1.7	.56	.90	.35	27	1.6	2.9	1.8	.33	1.7	.23	3.7
22	1.0	.56	.80	.35	24	1.4	3.0	1.5	.83	.28	.22	34
23	.76	.53	.75	.35	62	1.5	11	1.3	.43	.17	.20	7.3
24	.73	.65	.70	.35	36	1.5	6.4	1.2	.30	.13	.19	3.2
25	1.3	.65	.65	.35	19	1.5	4.2	1.3	.24	.12	.17	2.3
26	1.0	.56	.60	1.6	12	4.2	3.2	1.3	.20	.13	.16	3.6
27	.76	.59	.60	1.6	8.4	4.3	2.8	1.1	.18	.17	.22	30
28	.65	.80	.55	1.3	28	2.9	7.6	1.0	.15	14	1.3	8.5
29	.63	.77	.55	1.1	---	2.7	5.6	.91	.13	2.0	2.8	3.6
30	.70	.74	.50	1.0	---	6.5	3.9	.82	.13	.38	6.3	17
31	.80	---	.50	.90	---	8.3	---	.75	---	.24	.66	---
TOTAL	45.16	20.16	165.25	16.90	593.15	118.8	389.1	266.58	40.61	55.44	64.48	513.16
MEAN	1.46	.67	5.33	.55	21.2	3.83	13.0	8.60	1.35	1.79	2.08	17.1
MAX	5.3	.96	41	1.6	110	17	90	110	24	20	27	184
MIN	.63	.53	.50	.35	.50	1.4	2.1	.75	.13	.07	.14	.81
CFSM	.23	.10	.83	.09	3.30	.60	2.02	1.34	.21	.28	.32	2.66
IN.	.26	.12	.96	.10	3.43	.69	2.25	1.54	.23	.32	.37	2.97

CAL YR 1980 TOTAL 1575.93 MEAN 4.31 MAX 69 MIN .09 CFSM .67 IN 9.12
WTR YR 1981 TOTAL 2288.79 MEAN 6.27 MAX 184 MIN .07 CFSM .98 IN 13.24

04148300 SWARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW¼ sec.26, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft (2 m) downstream from bridge on South Ballenger Highway, in Flint, 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--115 mi^2 (298 km^2).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft (221.605 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 4, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--11 years, 77.6 ft^3/s (2.198 m^3/s), 9.16 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft^3/s (89.5 m^3/s) Apr. 19, 1975, gage height, 9.02 ft (2.749 m); minimum, 0.01 ft^3/s (<0.001 m^3/s) Sept. 9, 1978; minimum gage height, 1.16 ft (0.354 m) Aug. 19, 1971, Aug. 26, 1981.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 800 ft^3/s (22.7 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	(m^3/s)	Gage height (ft)	(m)	Date	Time	Discharge (ft^3/s)	(m^3/s)	Gage height (ft)	(m)
Feb. 17	--	*1,340	37.9	*a8.10	2.469	May 11	1400	1,160	32.9	7.14	2.176
Apr. 14	1000	928	26.3	6.87	2.094						

a ice jam.

Minimum discharge, 0.31 ft^3/s (0.009 m^3/s) Aug. 26, gage height, 1.16 ft (0.354 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	26	16	19	16	245	90	85	32	12	5.6	16
2	30	24	56	19	15	191	78	77	30	10	4.7	9.8
3	31	24	54	18	15	145	70	71	29	24	5.1	10
4	38	23	42	18	15	125	87	67	26	36	5.2	531
5	32	22	36	18	14	106	84	63	25	32	4.3	318
6	28	21	46	18	14	97	72	60	22	18	3.8	132
7	26	22	218	18	14	103	64	55	20	14	3.7	84
8	23	22	328	17	14	94	59	50	37	11	34	67
9	21	20	322	17	14	87	184	45	32	9.3	17	49
10	19	19	174	17	15	85	139	148	24	7.9	7.0	40
11	19	18	101	17	54	82	337	922	21	6.7	4.8	36
12	18	17	76	16	45	76	377	631	18	5.6	3.4	32
13	18	16	66	16	47	74	363	350	28	33	2.9	29
14	23	19	56	16	40	65	765	235	121	12	3.2	28
15	28	16	50	16	38	63	439	196	62	7.6	14	26
16	35	16	44	16	110	59	276	169	46	6.2	4.8	38
17	50	15	39	16	700	56	213	144	36	5.2	3.3	53
18	49	15	35	15	1060	51	175	124	30	3.6	2.3	37
19	38	15	32	15	833	47	143	107	25	2.7	1.6	31
20	33	14	30	15	565	45	123	94	22	12	1.7	27
21	46	14	27	15	386	43	105	83	20	17	1.4	54
22	41	13	26	15	327	41	101	73	34	6.7	1.1	152
23	34	13	25	15	499	40	151	66	25	4.2	1.1	85
24	34	15	24	15	447	40	141	61	21	2.5	.68	59
25	40	14	23	16	328	39	119	59	18	2.1	.54	50
26	38	13	22	25	258	54	100	63	16	7.5	.54	57
27	33	15	21	27	210	64	89	53	13	3.3	1.6	146
28	31	16	21	29	262	58	94	48	12	49	18	84
29	28	17	20	25	---	56	102	44	10	23	36	56
30	26	16	20	20	---	66	96	39	9.5	11	40	156
31	26	---	19	17	---	93	---	35	---	7.3	15	---
TOTAL	964	530	2069	556	6355	2490	5236	4317	864.5	402.4	248.36	2492.8
MEAN	31.1	17.7	66.7	17.9	227	80.3	175	139	28.8	13.0	8.01	83.1
MAX	50	26	328	29	1060	245	765	922	121	49	40	531
MIN	18	13	16	15	14	39	59	35	9.5	2.1	.54	9.8
CFSM	.27	.15	.58	.16	1.97	.70	1.52	1.21	.25	.11	.07	.72
IN.	.31	.17	.67	.18	2.06	.81	1.69	1.40	.28	.13	.08	.81

CAL YR 1980 TOTAL 23410.40 MEAN 64.0 MAX 652 MIN 3.5 CFSM .56 IN 7.57
WTR YR 1981 TOTAL 26525.06 MEAN 72.7 MAX 1060 MIN .54 CFSM .63 IN 8.58

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE¼ SE¼ sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on Bristol Road, 6.0 mi (9.7 km) upstream from mouth, and 4.0 mi (6.4 km) southeast of Flint.

DRAINAGE AREA.--54.4 mi² (140.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft (232.977 m) National Geodetic Vertical Datum of 1929. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--11 years, 36.0 ft³/s (1.020 m³/s), 8.99 in/yr (228 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft³/s (35.7 m³/s) Apr. 19, 1975, gage height, 7.65 ft (2.332 m) from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 18	--	460	13.0	*a6.08	1.853	Sep. 4	1800	*572	16.2	5.99	1.826
May 11	0800	337	9.54	5.39	1.643						

a ice jam.

Minimum discharge, 0.45 ft³/s (0.013 m³/s) Aug. 25, gage height, 0.61 ft (0.186 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.9	10	11	8.0	12	89	51	44	12	6.6	5.4	17
2	11	9.6	28	8.0	12	74	45	42	11	6.4	5.1	11
3	11	9.4	19	8.0	12	62	41	40	11	6.7	4.3	8.0
4	13	9.6	21	7.5	12	56	49	35	12	11	3.6	345
5	11	9.1	22	7.5	12	48	42	29	10	24	3.0	178
6	12	9.2	23	7.5	11	42	37	23	9.5	6.9	2.7	104
7	11	9.5	60	7.5	11	38	33	20	8.2	5.6	2.5	86
8	9.8	12	89	7.5	11	35	30	17	12	4.7	3.3	58
9	9.6	10	83	7.5	11	33	79	16	13	3.8	3.9	40
10	8.6	11	67	7.5	12	33	49	54	12	4.0	4.3	30
11	7.7	10	41	7.5	32	33	111	240	9.8	5.7	2.7	23
12	8.0	9.9	35	7.5	43	32	119	201	8.1	5.2	1.9	18
13	7.7	9.5	30	7.5	37	31	117	173	8.8	13	1.6	14
14	8.1	9.5	26	7.5	37	29	180	122	24	6.8	1.3	12
15	12	9.2	22	7.5	42	27	135	96	22	4.8	3.5	11
16	13	9.0	20	7.5	85	27	114	80	30	4.1	4.0	12
17	13	8.3	18	7.5	180	25	91	67	25	3.3	4.2	26
18	13	8.5	17	7.5	370	23	73	56	16	2.9	6.3	17
19	12	8.5	15	7.5	370	21	59	46	12	2.7	3.5	15
20	11	8.7	14	7.5	238	21	48	38	10	2.4	2.0	12
21	16	8.8	13	9.0	193	19	38	33	9.5	3.5	1.3	14
22	12	8.8	12	10	162	19	35	27	18	3.5	1.1	64
23	12	9.0	12	10	187	19	54	23	15	3.4	1.0	36
24	12	9.7	11	11	181	19	49	21	13	2.5	.80	32
25	15	9.9	10	11	160	19	52	22	11	2.0	.69	25
26	13	9.4	10	16	126	28	48	28	9.8	2.8	1.1	24
27	13	9.5	9.5	18	103	31	41	22	8.7	3.3	2.0	41
28	12	11	9.0	15	110	36	40	18	8.0	17	6.3	28
29	11	11	8.5	14	---	39	39	16	8.0	9.5	10	26
30	11	11	8.5	13	---	56	42	14	7.1	6.8	23	39
31	10	---	8.0	12	---	55	---	13	---	5.5	8.7	---
TOTAL	348.4	288.6	772.5	290.5	2772	1119	1941	1676	384.5	190.4	125.09	1366.0
MEAN	11.2	9.62	24.9	9.37	99.0	36.1	64.7	54.1	12.8	6.14	4.04	45.5
MAX	16	12	89	18	370	89	180	240	30	24	23	345
MIN	7.7	8.3	8.0	7.5	11	19	30	13	7.1	2.0	.69	8.0
CFSM	.21	.18	.46	.17	1.82	.66	1.19	.99	.24	.11	.07	.84
IN.	.24	.20	.53	.20	1.90	.77	1.33	1.15	.26	.13	.09	.93

CAL YR 1980 TOTAL 10709.80 MEAN 29.3 MAX 222 MIN 4.4 CFSM .54 IN 7.32
WTR YR 1981 TOTAL 11273.99 MEAN 30.9 MAX 370 MIN .69 CFSM .57 IN 7.71

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW¼ sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi (1.9 km) upstream from Pirnie Creek, 1.8 mi (2.9 km) downstream from Flint, and 5.0 mi (8.0 km) downstream from Swartz Creek.

DRAINAGE AREA.--956 mi² (2,476 km²).

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft (206.898 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good. Some regulation by reservoirs above station (station 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft³/s (1.42 m³/s) as sewage effluent which originiates outside the basin. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--49 years, 578 ft³/s (16.37 m³/s), 8.21 in/yr (209 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft³/s (422 m³/s) Apr. 6, 1947, gage height, 16.35 ft (4.983 m); minimum, 9.0 ft³/s (0.25 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,040 ft³/s (143 m³/s) Feb. 19, gage height, 10.56 ft (3.219 m); minimum, 89 ft³/s (2.52 m³/s) July 25, gage height, 2.78 ft (0.847 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	748	323	232	257	363	2970	926	1050	417	394	141	301
2	743	322	415	260	370	2670	935	1030	456	465	137	281
3	593	324	307	257	374	2420	892	1050	363	323	160	255
4	557	321	297	254	379	2150	983	1020	331	551	137	3040
5	522	320	303	263	374	2050	921	951	311	715	144	3260
6	498	315	340	278	363	1650	877	899	314	436	167	2350
7	388	320	830	281	352	1580	717	781	375	352	133	2460
8	366	580	1230	272	281	1470	591	706	473	320	310	2750
9	397	485	1710	266	278	1270	1020	639	393	307	370	2550
10	387	485	1550	254	298	1150	923	909	319	294	273	1970
11	362	446	1320	246	477	1090	1470	3720	400	280	277	1470
12	315	451	1460	243	347	1030	1520	3800	403	263	224	1170
13	344	480	1450	260	397	1120	1420	3450	439	529	187	1060
14	426	545	1320	269	406	1090	3640	3360	1350	325	187	985
15	449	495	1210	272	448	820	2170	3110	896	277	294	918
16	493	480	1130	263	1040	706	1750	2350	495	243	213	981
17	510	490	1070	254	2630	709	2000	2140	428	225	183	959
18	503	650	469	249	4120	699	2060	1570	385	203	187	700
19	485	655	394	260	4690	694	1890	1220	367	196	186	616
20	479	705	366	260	4230	690	1590	1040	332	229	186	578
21	564	865	342	249	4300	680	1230	1130	315	250	183	613
22	521	825	350	260	4240	665	1160	934	413	203	173	1040
23	481	825	246	275	4810	663	1280	626	337	161	166	934
24	471	840	209	254	3700	663	1230	664	324	220	173	853
25	476	540	199	254	3550	629	1170	725	318	212	177	869
26	407	294	197	359	3380	724	1110	716	305	126	174	1100
27	413	246	199	420	3080	731	1080	657	291	143	179	1400
28	452	249	199	410	3200	691	1180	627	268	534	297	1200
29	394	240	252	320	---	712	1200	583	239	276	473	1040
30	336	226	257	307	---	854	1150	492	265	195	441	1290
31	351	---	254	316	---	907	---	445	---	162	262	---
TOTAL	14401	14342	20107	8642	52477	35967	40085	42476	12322	9407	6792	38993
MEAN	465	478	649	279	1874	1160	1336	1370	411	303	219	1300
MAX	748	865	1710	420	4810	2970	3640	3800	1350	715	473	3260
MIN	315	226	197	243	278	629	591	445	239	126	133	255
MEAN *	469	353	668	284	1954	1064	1472	1351	408	238	225	1374
CFSM *	.49	.37	.70	.30	2.04	1.11	1.54	1.41	.43	.25	.24	1.44
IN *	.57	.41	.81	.34	2.13	1.28	1.72	1.63	.48	.29	.27	1.60

CAL YR 1980 TOTAL 246362 MEAN 673 MAX 3010 MIN 164 MEAN * 672 CFSM * .70 IN * 9.57
WTR YR 1981 TOTAL 295989 MEAN 811 MAX 4810 MIN 126 MEAN * 811 CFSM * .85 IN * 11.52
* Adjusted for change in contents in Holloway Reservoir.

04148720 BRENT RUN NEAR MONTROSE, MI

LOCATION.--Lat 43°10'12", long 83°50'05", in SE¼ NE¼ sec.23, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Morrish Road, 0.8 mi (1.3 km) upstream from Central-Stadler Drain, 3.0 mi (4.8 km) upstream from mouth, and 3.1 mi (5.0 km) east of Montrose.

DRAINAGE AREA.--20.8 mi² (53.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 655 ft (200 m) from topographic map (nearest 5 ft). Prior to Aug. 26, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 14.7 ft³/s (0.416 m³/s), 9.60 in/yr (244 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 730 ft³/s (20.7 m³/s) Dec. 31, 1972, gage height, 6.34 ft (1.932 m); maximum gage height, 7.08 ft (2.158 m) Mar. 15, 1971, backwater from ice; minimum discharge, 1.9 ft³/s (0.054 m³/s) Oct. 13, 1978; minimum gage height, 1.01 ft (0.308 m) Aug. 9, 17, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 250 ft³/s (7.08 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 18	--	500	14.2	*a6.14	1.871	May 12	0100	358	10.1	4.70	1.433
Apr. 14	2100	*522	14.8	5.62	1.713	Sep. 5	0400	263	7.45	4.08	1.244

a ice jam.

Minimum discharge, 2.5 ft³/s (0.071 m³/s) July 27, 28, gage height, 1.05 ft (0.320 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.6	4.4	9.7	5.2	5.3	32	7.8	11	4.4	3.6	4.7	14
2	5.5	4.5	12	5.2	5.0	15	7.2	9.0	4.1	7.2	4.3	16
3	7.9	4.5	48	5.2	4.8	11	6.6	8.1	4.2	4.7	3.8	9.5
4	11	4.4	18	5.0	4.7	9.4	6.4	7.2	4.5	15	3.7	52
5	7.6	4.7	14	5.0	4.7	8.9	8.2	6.7	4.1	26	3.6	189
6	5.4	5.7	15	5.0	4.6	8.7	6.2	6.7	4.1	11	3.6	30
7	4.9	5.2	35	4.9	4.5	9.0	5.6	6.3	3.8	5.4	3.5	16
8	4.9	5.6	90	5.0	4.5	7.4	5.6	6.4	4.0	4.4	5.2	13
9	4.5	8.5	100	4.9	4.5	7.0	15	5.8	8.8	4.0	9.1	12
10	4.2	7.3	30	4.8	4.5	7.2	18	22	6.1	3.5	5.4	7.8
11	4.5	6.1	16	4.8	5.7	7.5	31	189	4.3	3.3	3.7	6.5
12	4.5	6.3	12	4.7	10	7.2	50	212	3.9	3.3	5.4	5.8
13	4.2	7.0	9.8	4.7	42	7.1	24	47	4.1	3.3	5.3	5.2
14	4.5	7.6	9.0	4.6	45	6.8	180	22	12	16	4.1	4.6
15	18	8.6	8.5	4.6	25	6.6	211	15	71	5.8	10	4.2
16	14	8.2	8.0	4.6	55	6.4	37	13	16	4.5	12	4.8
17	18	7.3	7.5	4.6	260	6.2	23	11	9.5	3.9	5.3	26
18	16	7.3	7.0	4.5	460	6.2	19	9.5	6.9	3.4	4.3	28
19	10	7.0	6.8	4.5	376	7.3	14	8.1	5.7	3.4	4.0	9.9
20	7.0	7.9	6.5	4.5	160	6.6	12	7.7	4.9	3.0	3.9	6.6
21	6.8	7.9	6.5	4.5	35	6.6	10	7.2	5.1	7.4	3.9	6.2
22	12	8.2	6.3	4.4	22	6.7	9.7	7.7	7.2	5.5	3.6	26
23	7.6	8.2	6.0	4.4	61	6.0	21	7.1	10	3.7	3.6	14
24	6.5	8.5	6.0	4.4	48	6.0	17	6.4	4.8	3.1	3.3	7.3
25	7.6	9.1	6.0	4.4	22	6.2	13	8.3	4.1	3.1	3.2	5.9
26	12	10	5.8	4.4	15	6.7	10	11	3.9	3.0	3.3	9.4
27	6.2	9.1	5.6	10	12	13	8.9	6.8	3.5	2.7	3.2	71
28	4.9	9.4	5.6	11	44	8.0	9.2	6.0	3.4	12	5.2	49
29	4.5	12	5.4	8.5	---	7.0	20	5.4	3.2	44	29	11
30	4.4	10	5.4	6.5	---	6.9	14	5.0	3.2	8.7	47	11
31	4.2	---	5.3	5.8	---	11	---	4.8	---	5.6	21	---
TOTAL	237.9	220.5	526.7	164.6	1744.8	267.6	820.4	699.2	234.8	233.5	231.2	671.7
MEAN	7.67	7.35	17.0	5.31	62.3	8.63	27.3	22.6	7.83	7.53	7.46	22.4
MAX	18	12	100	11	460	32	211	212	71	44	47	189
MIN	4.2	4.4	5.3	4.4	4.5	6.0	5.6	4.8	3.2	2.7	3.2	4.2
CFSM	.37	.35	.82	.26	3.00	.42	1.31	1.09	.38	.36	.36	1.08
IN.	.43	.39	.94	.29	3.12	.48	1.47	1.25	.42	.42	.41	1.20

CAL YR 1980 TOTAL 3899.3 MEAN 10.7 MAX 150 MIN 3.0 CFSM .51 IN 6.97
WTR YR 1981 TOTAL 6052.9 MEAN 16.6 MAX 460 MIN 2.7 CFSM .80 IN 10.82

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE¼ SE¼ sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 13, 2 mi (3 km) west of Fosters and 6.5 mi (10.5 km) downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,188 mi² (3,077 km²), includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m), from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi (3.5 km) upstream at datum 582.22 ft (177.461 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Oct. 5 to Nov. 6, Nov. 13 to Feb. 12, and April 11 to May 8, which are fair. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 729 ft³/s (20.65 m³/s), 8.33 in/yr (212 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft³/s (538 m³/s) Apr. 7, 1947 (including flow bypassing gage); maximum gage height, 18.6 ft (5.67 m) Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft³/s (0.76 m³/s) Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft (5.61 m) from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,360 ft³/s (180 m³/s) May 12; maximum gage height, 16.70 ft (5.090 m) Feb. 18, backwater from ice; minimum discharge, 187 ft³/s (5.296 m³/s) Aug. 6, gage height, 2.05 ft (0.625 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	814	400	270	300	400	3660	971	1300	549	360	246	518
2	790	380	390	300	430	3080	965	1200	532	521	220	515
3	724	380	460	300	440	2660	908	1100	524	543	211	412
4	664	370	350	300	430	2350	932	1100	454	465	225	1100
5	640	370	350	320	430	2200	986	1100	412	725	202	4000
6	610	370	370	330	420	1970	908	1000	399	698	196	3500
7	600	380	600	340	400	1640	839	900	394	518	222	2430
8	440	415	1200	360	340	1600	671	750	434	437	216	2660
9	420	580	2000	370	340	1470	848	731	529	399	423	2670
10	450	529	1900	340	350	1300	1200	770	434	384	373	2360
11	440	511	1700	310	350	1220	1000	3390	394	365	324	1900
12	410	490	1400	300	500	1140	1600	6080	448	350	321	1480
13	390	540	1700	300	470	1110	1600	4870	431	339	268	1170
14	390	590	1700	310	450	1190	2100	3900	524	602	239	1090
15	460	600	1500	300	500	1100	4500	3510	1770	391	273	1000
16	500	560	1400	300	620	827	3100	2970	938	339	371	956
17	540	560	1300	300	1500	776	2000	2290	602	304	273	1190
18	600	700	1100	300	5000	767	2100	1970	526	292	242	1220
19	600	750	600	300	6040	737	2200	1430	490	275	242	878
20	600	800	470	300	5230	722	2000	1270	462	266	237	737
21	580	900	430	300	4700	716	1800	1140	459	316	234	674
22	640	1000	390	300	4530	695	1500	1220	476	324	232	1100
23	600	960	350	300	4660	683	1300	833	540	263	222	1300
24	560	960	300	300	4810	686	1440	707	451	213	216	1030
25	550	800	250	300	4050	677	1400	752	431	263	220	935
26	540	500	240	400	3750	659	1300	785	417	280	225	1060
27	490	300	240	480	3400	830	1200	752	397	191	225	2240
28	470	290	240	470	3500	776	1200	695	376	297	249	2220
29	510	280	260	390	---	734	1300	665	355	785	440	1470
30	450	270	290	350	---	764	1300	623	332	404	587	1220
31	400	---	300	350	---	938	---	587	---	290	487	---
TOTAL	16872	16535	24050	10220	58040	39677	45168	50390	15480	12199	8661	45035
MEAN	544	551	776	330	2073	1280	1506	1625	516	394	279	1501
MAX	814	1000	2000	480	6040	3660	4500	6080	1770	785	587	4000
MIN	390	270	240	300	340	659	671	587	332	191	196	412

CAL YR 1980 TOTAL 282615 MEAN 772 MAX 3560 MIN 234
WTR YR 1981 TOTAL 342327 MEAN 938 MAX 6080 MIN 191

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE¼ sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft (30 m) downstream from the Prairie Farms Association flood-pumping station, 2.8 mi (4.5 km) north of Alicia, and 4 mi (6 km) upstream from mouth.

PERIOD OF RECORD.--November 1948 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft (175.870 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft (4.176 m) Apr. 3, 1960; minimum, less than 1.5 ft (0.46 m) during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 11.68 ft (3.560 m) Feb. 19; minimum, 2.66 ft (0.811 m) Nov. 6.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.13	4.38	3.66	3.37	3.36	8.40	3.43			---	3.90	3.94
2	4.46	3.95	5.40	3.68	3.47	8.06	3.85			---	3.85	4.38
3	5.37	3.47	4.73	3.60	3.57	7.53	3.50			---	3.94	4.36
4	4.80	3.70	4.05	3.50	3.50	6.87	3.06			---	3.84	4.99
5	4.55	4.12	3.75	3.44	3.47	6.42	3.44			---	4.24	6.36
6	3.98	3.49	3.58	3.35	3.39	5.98	3.86			---	4.05	6.43
7	4.44	4.30	3.87	3.53	3.41	5.52	3.47			---	3.97	5.87
8	4.14	4.03	4.97	3.56	3.18	5.17	3.52			---	4.13	5.89
9	4.75	3.40	6.58	3.48	3.35	4.73	4.18			---	4.04	6.06
10	4.10	4.48	6.88	3.62	3.39	4.57	4.52			4.16	3.81	5.43
11	4.00	4.34	6.53	3.60	3.17	4.57	4.84			4.10	4.07	5.06
12	4.44	3.88	5.85	3.59	3.41	4.30	5.87			4.04	3.96	4.72
13	4.34	3.66	5.55	3.55	3.41	4.45	5.63			4.12	4.08	4.37
14	4.23	4.07	5.12	3.33	3.39	4.32	6.12			4.49	3.91	4.43
15	4.34	4.01	5.07	3.29	3.31	3.85	8.00			4.27	4.11	4.41
16	4.29	3.91	4.98	3.43	3.34	4.66	7.66			4.09	4.81	4.86
17	4.14	3.71	4.47	3.39	5.27	4.46	6.84			4.03	4.35	5.71
18	4.37	4.23	4.52	3.40	9.54	4.11	6.47			4.01	4.17	5.21
19	4.69	3.79	4.34	3.42	11.14	3.94	5.99			4.00	4.25	4.45
20	4.59	3.51	3.87	3.54	10.84	3.78	5.78			4.08	4.26	4.47
21	4.52	3.40	3.71	3.40	11.11	3.81	5.19			4.43	4.16	4.36
22	4.70	3.55	3.63	3.46	10.96	3.62	4.66			4.26	4.01	4.88
23	4.52	3.56	3.60	3.56	10.77	3.56	4.49			4.07	3.84	4.89
24	4.06	3.96	3.98	3.53	10.58	3.71	---			4.08	4.22	4.49
25	3.79	4.04	3.82	3.42	10.28	3.64	---			3.84	4.02	4.28
26	3.86	3.66	3.40	3.28	9.95	3.45	---			4.29	3.89	4.29
27	4.16	4.14	3.59	3.66	9.24	3.82	---			4.36	4.00	6.17
28	4.52	3.15	3.20	3.69	8.56	3.56	---			4.68	4.02	7.31
29	4.20	3.21	3.64	3.69	---	3.28	---			4.86	3.67	6.78
30	3.66	3.37	3.69	3.59	---	3.39	---			4.20	3.86	6.11
31	3.51	---	3.52	3.48	---	3.88	---			3.93	3.95	---
MEAN	4.31	3.82	4.43	3.50	6.16	4.69	---			---	4.04	5.17
MAX	5.37	4.48	6.88	3.69	11.14	8.40	---			---	4.81	7.31
MIN	3.51	3.15	3.20	3.28	3.17	3.28	---			---	3.67	3.94

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE¼ NE¼ sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft (183 m) downstream from bridge on Cemetery Road, 0.3 mi (0.5 km) downstream from confluence of North and South Branches, and 1.1 mi (1.8 km) south of Cass City.

DRAINAGE AREA.--359 mi² (930 km²).

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft (212.726 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft (183 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 200 ft³/s (5.664 m³/s), 7.57 in/yr (192 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft³/s (240 m³/s) Mar. 20, 1948, gage height, 15.80 ft (4.816 m), from graph based on gage readings; minimum, 0.50 ft³/s (0.014 m³/s) Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (39.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 20	0900	4220	120	11.92	3.633	May 12	0400	3090	87.5	10.76	3.280
Feb. 24	0200	3460	98.0	11.09	3.380	Sept. 5	1600	*4400	125	*13.00	3.962
Mar. 1	0600	1420	40.2	8.33	2.539	Sept. 28	0300	2370	67.1	10.42	3.176
Apr. 29	2300	1470	41.6	8.50	2.591						

Minimum discharge, 10 ft³/s (0.28 m³/s) July 17, gage height, 4.61 ft (1.405 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	31	40	48	51	1310	185	750	75	21	29	109
2	42	31	44	48	51	884	174	510	70	24	21	343
3	44	31	48	48	51	617	153	352	69	22	18	567
4	46	31	52	48	51	483	144	256	67	182	17	1450
5	58	31	58	49	51	378	139	205	62	303	15	4230
6	64	33	58	49	51	312	130	177	55	135	14	3800
7	60	32	75	49	51	263	117	153	50	79	17	2830
8	53	34	184	49	51	231	108	134	47	50	22	1670
9	49	36	486	49	51	208	202	120	47	33	342	870
10	44	37	514	50	51	207	276	197	46	24	383	546
11	39	34	250	50	52	209	264	1730	44	19	157	378
12	35	33	170	50	52	204	320	2740	40	16	77	274
13	33	32	130	50	53	207	293	1530	36	15	48	207
14	30	34	110	50	56	180	494	958	40	13	39	164
15	32	34	90	50	60	178	1110	658	42	12	42	134
16	43	35	80	50	70	164	545	510	43	11	50	116
17	66	35	75	50	98	153	371	411	39	12	54	447
18	90	34	70	50	980	137	303	303	34	19	43	1120
19	100	33	65	50	3000	117	241	241	29	25	33	967
20	89	33	60	50	4150	117	195	201	25	24	25	534
21	74	33	57	51	3110	117	165	174	25	19	20	376
22	64	35	55	51	2050	115	143	148	104	17	17	773
23	59	38	53	51	2420	115	154	128	117	17	15	968
24	53	37	52	51	3010	115	193	117	94	14	14	554
25	49	35	51	51	1860	115	203	116	64	12	12	382
26	45	36	50	51	1300	115	185	119	47	12	11	349
27	46	32	50	51	880	132	165	108	38	12	11	1480
28	41	35	49	51	981	144	324	103	31	15	20	2020
29	37	36	49	51	---	150	1030	100	25	49	120	940
30	36	39	49	51	---	164	1210	93	23	82	132	577
31	33	---	48	51	---	185	---	85	---	49	99	---
TOTAL	1602	1020	3222	1548	24692	8026	9536	13427	1528	1337	1917	29175
MEAN	51.7	34.0	104	49.9	882	259	318	433	50.9	43.1	61.8	973
MAX	100	39	514	51	4150	1310	1210	2740	117	303	383	4230
MIN	30	31	40	48	51	115	108	85	23	11	11	109
CFSM	.14	.10	.29	.14	2.46	.72	.89	1.21	.14	.12	.17	2.71
IN.	.17	.11	.33	.16	2.56	.83	.99	1.39	.16	.14	.20	3.02

CAL YR 1980 TOTAL 55560.0 MEAN 152 MAX 2170 MIN 9.5 CFSM .42 IN 5.76
WTR YR 1981 TOTAL 97030.0 MEAN 266 MAX 4230 MIN 11 CFSM .74 IN 10.05

04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW¼ NW¼ sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft (27 m) upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi (3.1 km) downstream from Michigan Sugar Co. dam, and 40 mi (64 km) upstream from mouth.

DRAINAGE AREA.--645 mi^2 (1,671 km^2).

PERIOD OF RECORD.--October 1968 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft (198 m) from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft (27 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dam at Michigan Sugar Co., 1.9 mi (3.1 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--13 years, 394 ft^3/s (11.16 m^3/s), 8.30 in/yr (211 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft^3/s (331 m^3/s) Mar. 6, 1976, gage height, 19.92 ft (6.072 m); minimum, 20 ft^3/s (0.57 m^3/s) Oct. 2, 3, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,400 ft^3/s (68.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 19	--	7370	209	ice jam		Sept. 6	0500	*8170	231	*17.28	5.267
Feb. 24	1500	4710	133	13.68	4.170	Sept. 28	1000	4560	129	13.37	4.075
May 12	1400	4930	140	13.90	4.237						

Minimum discharge, 36 ft^3/s (1.02 m^3/s) July 17, gage height, 3.00 ft (0.914 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	134	98	131	120	115	2080	371	1440	170	70	104	329
2	120	91	135	120	115	1680	352	986	157	70	73	566
3	126	90	145	120	115	1090	279	734	149	71	57	877
4	155	96	155	120	115	862	136	563	144	75	50	1530
5	178	98	165	120	115	706	112	456	135	288	47	5820
6	172	96	172	120	115	605	243	389	128	293	43	7890
7	162	100	242	120	115	509	234	340	116	173	50	5920
8	146	104	485	120	115	450	239	299	114	125	121	3760
9	130	109	1050	120	115	421	413	270	116	97	305	2010
10	115	113	1140	120	115	416	669	349	110	75	668	1180
11	106	108	720	120	115	426	617	2520	103	60	416	823
12	98	102	450	120	115	417	642	4710	98	54	236	609
13	90	100	300	120	125	405	712	3490	100	51	180	467
14	92	105	240	120	155	382	761	2000	116	45	155	379
15	123	108	210	115	170	354	1640	1340	121	41	178	318
16	143	108	200	115	204	343	1380	1060	121	40	196	278
17	179	105	185	115	500	321	934	875	115	38	193	506
18	212	106	180	115	1920	287	688	693	99	47	159	1820
19	215	103	170	115	5100	254	550	560	91	59	124	1890
20	201	103	145	115	7010	244	442	470	77	65	100	1170
21	182	105	135	115	5510	243	369	404	90	64	81	780
22	164	103	125	115	3750	246	324	350	137	54	67	1150
23	149	106	120	115	3200	246	280	304	227	48	57	1780
24	139	115	120	115	4440	250	128	275	212	44	53	1200
25	134	114	120	115	3580	247	395	264	182	41	47	803
26	128	110	120	115	2340	251	406	257	143	41	44	696
27	121	106	120	115	1620	281	358	244	117	38	42	2750
28	120	111	120	115	1470	297	435	226	99	47	59	4330
29	110	123	120	115	---	303	1300	213	88	101	251	2560
30	107	128	120	115	---	320	2150	203	79	150	407	1320
31	101	---	120	115	---	352	---	185	---	146	348	---
TOTAL	4352	3164	7960	3635	42474	15288	17559	26469	3754	2611	4911	55511
MEAN	140	105	257	117	1517	493	585	854	125	84.2	158	1850
MAX	215	128	1140	120	7010	2080	2150	4710	227	293	668	7890
MIN	90	90	120	115	115	243	112	185	77	38	42	278
CFSM	.22	.16	.40	.18	2.35	.76	.91	1.32	.19	.13	.25	2.87
IN.	.25	.18	.46	.21	2.45	.88	1.01	1.53	.22	.15	.28	3.20

CAL YR 1980 TOTAL 101324 MEAN 277 MAX 3270 MIN 31 CFSM .43 IN 5.84
WTR YR 1981 TOTAL 187688 MEAN 514 MAX 7890 MIN 38 CFSM .80 IN 10.82

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW¼ SE¼ sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft (610 m) below dam in Frankenmuth, 3,600 ft (1,097 m) above highway bridge on Dehmel Road, 3.4 mi (5.5 km) upstream from Dead Creek, and 17 mi (27 km) upstream from mouth.

DRAINAGE AREA.--841 mi^2 (2,178 km^2).

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft (177.991 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Feburary 1908 to March 1909, nonrecording gage at site 2,000 ft (610 m) upstream at datum 1.81 ft (0.552 m) lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, and June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft (1,097 m) downstream at datum 0.04 ft (0.012 m) higher.

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, Feb. 12 to Apr. 16, which are poor. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, 477 ft^3/s (13.51 m^3/s), 7.70 in/yr (196 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft^3/s (501 m^3/s) Mar. 18, 1942, gage height, 20.88 ft (6.364 m), site and datum then is use; maximum gage height, 23.37 ft (7.123 m) Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft^3/s (0.042 m^3/s) Aug. 6, 1944.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft^3/s (99.1 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 20	unknown	7650	217	18.60	5.669	Sept. 6	2200	*8320	236	*19.79	6.032
May 12	2100	5930	168	17.02	5.188	Sept. 28	1700	4640	131	16.25	4.953

Minimum discharge, 64 ft^3/s (1.81 m^3/s) July 17, gage height, 3.54 ft (1.079 m).

DISCHARGE, IN CURIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	197	163	183	140	140	2500	510	1850	196	109	158	581
2	180	156	202	140	140	1700	460	1260	181	107	123	562
3	194	149	198	140	140	1320	400	916	172	105	103	785
4	254	155	230	140	140	1080	310	692	165	136	93	1510
5	282	162	254	140	140	930	280	560	157	255	88	4240
6	262	159	253	140	140	810	330	482	148	401	82	7580
7	244	160	375	140	140	720	390	408	138	265	93	7390
8	229	162	758	140	140	640	470	363	133	184	185	4980
9	206	164	1380	140	140	620	700	326	137	144	258	2600
10	183	169	1510	140	140	600	1000	484	132	118	563	1520
11	170	165	1100	140	140	580	980	3310	124	99	650	1030
12	159	157	656	140	140	560	1050	5690	118	89	405	796
13	151	151	595	140	145	540	1150	4980	120	83	286	621
14	151	156	465	140	150	520	1550	2830	146	79	239	519
15	194	161	345	140	250	500	2000	1820	169	71	255	441
16	237	158	319	140	460	475	1720	1390	159	68	276	398
17	284	154	297	140	1500	450	1340	1120	151	66	274	588
18	336	153	258	140	5000	425	1010	892	136	71	250	1410
19	335	148	273	140	7000	390	770	705	121	77	219	1880
20	311	144	253	140	8000	370	624	584	110	87	191	1480
21	290	145	227	140	6600	375	517	499	182	92	165	1020
22	273	146	199	140	4600	380	448	426	188	91	142	1170
23	247	143	171	140	4800	380	481	368	248	81	128	1660
24	229	154	155	140	5300	380	415	326	272	74	121	1520
25	221	165	145	140	3500	385	398	326	232	70	115	1020
26	214	160	142	140	2350	415	564	311	189	71	111	936
27	200	153	140	140	2100	445	502	295	154	69	109	2650
28	194	154	140	140	2350	460	513	272	132	112	124	4490
29	186	171	140	140	---	475	1120	250	116	157	186	3490
30	174	180	140	140	---	500	2110	233	112	160	424	1860
31	168	---	140	140	---	545	---	216	---	179	458	---
TOTAL	6955	4717	11643	4340	55785	20470	24112	34184	4738	3770	6874	60727
MEAN	224	157	376	140	1992	660	804	1103	158	122	222	2024
MAX	336	180	1510	140	8000	2500	2110	5690	272	401	650	7580
MIN	151	143	140	140	140	370	280	216	110	66	82	398
CFSM	.27	.19	.45	.17	2.37	.79	.96	1.31	.19	.15	.26	2.41
IN.	.31	.21	.52	.19	2.47	.91	1.07	1.51	.21	.17	.30	2.69

CAL YR 1980 TOTAL 131909 MEAN 360 MAX 3930 MIN 61 CFSM .43 IN 5.83
WTR YR 1981 TOTAL 238315 MEAN 653 MAX 8000 MIN 66 CFSM .78 IN 10.54

04152500 TOBACCO RIVER AT BEAVERTON, MI

LOCATION.--Lat 43°52'43", long 84°28'18", in NW¼ SE¼ sec.7, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, on left bank 15 ft (5 m) downstream from bridge on Glidden Road, 1.0 mi (1.6 km) downstream from dam in Beaverton, and 2.0 mi (3.2 km) upstream from Venison Creek.

DRAINAGE AREA.--487 mi^2 (1,261 km^2).

PERIOD OF RECORD.--July 1948 to current year.

REVISED RECORDS.--WSP 1307: 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 683.27 ft (208.261 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, May 26 to June 30, which are poor. Prior to Feb. 21, 1961, regulation at all stages by hydroelectric powerplant 1.0 mi (1.6 km) above station; occasional regulation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 375 ft^3/s (10.62 m^3/s), 10.46 in/yr (266 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,680 ft^3/s (217 m^3/s) July 9, 1957, gage height, 12.95 ft (3.947 m); minimum, 5.6 ft^3/s (0.16 m^3/s) July 12, 13, 14, 1959, Aug. 21, 1961; minimum daily, 5.9 ft^3/s (0.17 m^3/s) July 12, 13, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,630 ft^3/s (74.5 m^3/s) Apr. 29, gage height, 7.62 ft (2.323 m); minimum, 129 ft^3/s (3.65 m^3/s) Dec. 11, gage height, 1.93 ft (0.588 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	198	279	264	215	228	1120	643	926	270	206	163	230
2	199	270	268	210	241	853	489	764	260	207	156	220
3	342	263	214	210	245	562	445	557	250	200	154	209
4	295	263	249	210	245	520	431	510	245	193	157	204
5	291	271	314	215	235	501	483	443	240	187	157	164
6	289	277	299	215	234	431	455	397	240	185	155	159
7	272	277	312	215	232	422	347	389	235	180	156	172
8	257	280	695	215	240	417	320	337	230	171	165	178
9	217	290	977	215	245	415	1360	330	230	164	182	195
10	190	293	630	215	250	440	1630	325	230	155	234	174
11	204	286	308	215	250	478	1010	826	225	148	175	165
12	206	266	361	218	250	448	696	1390	225	148	156	165
13	207	229	404	220	250	440	517	1060	225	153	158	161
14	230	311	317	220	250	444	758	535	240	152	158	159
15	264	426	341	220	250	418	1070	529	440	149	178	159
16	417	389	274	222	249	380	792	484	380	147	241	160
17	569	338	237	222	259	399	511	422	340	150	201	223
18	635	325	191	225	543	379	508	342	310	152	164	199
19	510	298	220	225	1240	342	463	312	285	160	162	204
20	365	276	218	222	1390	320	393	309	265	169	158	194
21	343	274	219	222	1730	300	376	291	260	170	153	233
22	335	267	218	225	1620	288	354	254	345	169	150	289
23	318	254	222	225	1640	282	381	244	300	164	146	334
24	301	254	235	225	1880	310	508	284	270	157	143	262
25	306	245	232	229	1670	332	541	320	255	152	141	304
26	330	244	234	227	960	356	470	350	230	149	139	285
27	330	243	237	229	769	379	407	340	215	147	142	357
28	317	251	212	230	1050	390	1200	325	195	152	194	253
29	303	258	215	240	---	399	2450	310	185	170	370	266
30	290	262	220	240	---	488	1860	295	190	180	309	252
31	285	---	218	241	---	606	---	280	---	172	251	---
TOTAL	9615	8459	9555	6877	18645	13859	21868	14480	7810	5158	5568	6529
MEAN	310	282	308	222	666	447	729	467	260	166	180	218
MAX	635	426	977	241	1880	1120	2450	1390	440	207	370	357
MIN	190	229	191	210	228	282	320	244	185	147	139	159
CFSM	.64	.58	.63	.46	1.37	.92	1.50	.96	.53	.34	.37	.45
IN.	.73	.65	.73	.53	1.42	1.06	1.67	1.11	.60	.39	.43	.50

CAL YR 1980 TOTAL 113625 MEAN 310 MAX 1560 MIN 148 CFSM .64 IN 8.68
WTR YR 1981 TOTAL 128423 MEAN 352 MAX 2450 MIN 139 CFSM .72 IN 9.81

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW¼ NW¼ sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft (4 m) downstream from bridge on South Leaton Road, 3.8 mi (6.1 km) northeast of Mount Pleasant, and 36 mi (58 mi) upstream from mouth.

DRAINAGE AREA.--416 mi^2 (1,077 km^2).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft (216.524 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft (9 m) upstream at present datum.

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, Dec. 8 to Jan. 27, which are poor. Diurnal fluctuation below 750 ft^3/s (21.2 m^3/s) caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 304 ft^3/s (8.609 m^3/s), 9.92 in/yr (252 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft^3/s (140 m^3/s) Mar. 8, 1946, gage height, 12.78 ft (3.895 m); minimum, 12 ft^3/s (0.34 m^3/s) Aug. 18, 1945; minimum daily, 19 ft^3/s (0.54 m^3/s) Aug. 16, 1936; minimum gage height, 2.70 ft (0.823 m) Oct. 8, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,000 ft^3/s (28.3 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 20	1600	*2470	70.0	*9.53	2.905	May 12	1300	1070	30.3	5.87	1.789

Minimum discharge, 123 ft^3/s (3.48 m^3/s) July 28; minimum gage height, 2.98 ft (0.908 m) Aug. 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	277	254	243	205	215	748	409	499	245	228	126	239
2	268	246	252	205	215	673	407	486	235	207	125	207
3	284	236	279	205	218	610	393	455	229	197	127	184
4	294	241	317	205	220	553	395	421	224	188	128	179
5	278	250	289	210	220	507	416	391	217	188	129	168
6	265	259	247	210	220	473	376	347	211	181	125	162
7	259	261	275	210	220	437	356	330	200	171	131	160
8	251	255	450	210	220	407	343	320	194	165	138	162
9	244	254	470	210	225	377	645	299	199	158	133	160
10	236	254	350	210	230	375	804	320	197	154	132	157
11	232	242	280	210	230	372	721	553	192	148	130	154
12	227	239	310	210	230	364	673	994	187	148	128	152
13	213	238	320	210	235	365	606	783	187	149	129	144
14	222	278	260	210	240	353	703	627	212	145	129	138
15	295	303	270	210	290	346	766	511	346	142	141	135
16	341	293	240	210	580	341	652	465	433	142	142	138
17	393	287	215	215	717	331	620	395	332	142	138	157
18	501	276	210	215	1150	322	566	355	265	140	136	155
19	427	267	205	215	1960	311	502	332	235	136	135	151
20	372	259	205	215	2320	303	467	313	213	137	133	148
21	350	254	210	215	2140	294	426	294	225	136	130	158
22	336	248	215	210	1140	286	399	279	293	135	128	182
23	315	245	220	210	1100	271	391	267	325	131	128	189
24	301	244	220	210	1110	268	405	271	267	129	127	186
25	313	242	215	210	1000	280	399	299	243	129	126	181
26	314	239	215	210	889	288	403	316	219	126	125	208
27	297	236	215	215	774	298	393	320	200	125	129	240
28	285	245	210	215	771	302	386	307	191	130	148	239
29	276	249	210	215	---	309	467	289	186	133	235	218
30	267	243	210	215	---	352	498	282	214	129	274	217
31	263	---	210	215	---	403	---	260	---	127	254	---
TOTAL	9196	7637	8037	6540	19079	11919	14987	12380	7116	4696	4439	5268
MEAN	297	255	259	211	681	384	500	399	237	151	143	176
MAX	501	303	470	215	2320	748	804	994	433	228	274	240
MIN	213	236	205	205	215	268	343	260	186	125	125	135
CFSM	.71	.61	.62	.51	1.64	.92	1.20	.96	.57	.36	.34	.42
IN.	.82	.68	.72	.58	1.71	1.07	1.34	1.11	.64	.42	.40	.47

CAL YR 1980 TOTAL 94890 MEAN 259 MAX 694 MIN 122 CFSM .62 IN 8.49
WTR YR 1981 TOTAL 111294 MEAN 305 MAX 2320 MIN 125 CFSM .73 IN 9.95

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW¼ SE¼ sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft (32 m) downstream from Superior Street Bridge in Alma, 0.6 mi (1.0 km) downstream from municipal reservoir, and 38 mi (61 km) upstream from mouth.

DRAINAGE AREA.--288 mi² (746 km²).

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft (218.959 m) National Geodetic Vertical Datum of 1929. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft (21 m) downstream from bridge and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation caused by dam 0.6 mi (1.0 km) above station and by variable backwater from powerplant at St. Louis, 5.2 mi (8.4 km) below station. About 3.4 ft³/s (0.10 m³/s) diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--51 years, 212 ft³/s (6.004 m³/s), 10.00 in/yr (254 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft³/s (125 m³/s) Mar. 19, 1948, gage height, 10.81 ft (3.295 m); minimum daily, 0.40 ft³/s (0.011 m³/s) Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,270 ft³/s (36.0 m³/s) Feb. 19, gage height, 6.34 ft (1.932 m); minimum, 34 ft³/s (0.96 m³/s) Sept. 11; minimum gage height, 0.88 ft (0.268 m) Aug. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	112	151	125	120	110	526	250	284	156	93	80	130
2	111	151	135	120	112	474	251	266	138	109	88	104
3	133	146	150	115	108	432	262	272	140	118	84	107
4	191	130	122	115	110	430	245	240	124	106	55	89
5	205	137	135	118	108	380	215	234	115	120	54	62
6	178	140	178	115	105	341	225	217	128	124	52	75
7	151	142	227	120	105	313	200	218	152	113	77	93
8	139	152	361	122	112	295	200	205	136	96	107	77
9	134	138	420	120	105	285	284	170	105	77	205	58
10	116	134	404	120	108	277	298	234	110	65	156	59
11	105	136	350	115	110	271	354	684	115	56	113	51
12	100	131	320	120	108	263	448	1110	110	68	109	41
13	112	128	270	120	108	254	497	1020	89	70	75	56
14	121	138	235	115	112	246	597	864	132	55	66	71
15	114	138	220	115	120	246	580	742	182	63	96	67
16	161	163	170	120	125	244	524	588	260	70	77	71
17	234	170	185	115	150	215	541	480	262	70	93	85
18	284	171	155	115	488	228	508	404	248	54	95	106
19	276	138	150	120	1220	204	430	341	200	62	73	123
20	259	132	150	115	1000	215	371	310	129	74	58	123
21	264	130	135	120	1020	198	342	258	144	93	60	127
22	242	111	130	120	1140	205	311	232	166	110	69	112
23	226	124	115	115	1070	205	300	217	158	108	83	129
24	194	128	110	112	936	189	286	231	192	63	78	155
25	204	117	115	115	772	204	290	222	183	60	63	146
26	221	115	105	120	685	226	305	234	145	73	56	152
27	210	126	102	125	578	197	305	246	120	86	43	244
28	203	129	105	120	590	208	283	220	112	95	74	236
29	193	116	108	118	---	222	286	176	101	72	94	232
30	186	123	115	115	---	240	282	152	86	108	124	246
31	168	---	115	110	---	231	---	174	---	124	141	---
TOTAL	5547	4085	5717	3645	11415	8464	10270	11245	4438	2655	2698	3427
MEAN	179	136	184	118	408	273	342	363	148	85.6	87.0	114
MAX	284	171	420	125	1220	526	597	1110	262	124	205	246
MIN	100	111	102	110	105	189	200	152	86	54	43	41
CFSM	.62	.47	.64	.41	1.42	.95	1.19	1.26	.51	.30	.30	.40
IN.	.72	.53	.74	.47	1.47	1.09	1.33	1.45	.57	.34	.35	.44

CAL YR 1980 TOTAL 66642 MEAN 182 MAX 781 MIN 29 CFSM .63 IN 8.61
WTR YR 1981 TOTAL 73606 MEAN 202 MAX 1220 MIN 41 CFSM .70 IN 9.51

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW¼ NW¼ sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi (11.6 km) southwest of Midland, and 7.8 mi (12.6 km) upstream from Chippewa River.

DRAINAGE AREA.--390 mi² (1,010 km²), approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft (190.177 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft (1.692 m) lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 294 ft³/s (8.326 m³/s), 10.24 in/yr (260 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft³/s (180 m³/s) Mar. 20, 1948, gage height, 10.00 ft (3.048 m), from graph based on gage readings; maximum gage height, 12.08 ft (3.682 m) Feb. 2, 1968, backwater from ice; minimum discharge, not determined.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 9	0900	1200	34.0	4.82	1.469
Feb. 20	1300	3500	99.1	7.40	2.256
Feb. 23	1200	*4240	120	*8.08	2.463
Mar. 1	0200	1720	48.7	5.47	1.667
May 12	0700	2640	74.8	6.54	1.993

Minimum discharge, 42 ft³/s (1.19 m³/s) July 26, gage height, 2.31 ft (0.704 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	159	274	148	165	158	1530	290	329	207	129	150	243
2	180	203	200	155	160	1050	355	355	209	131	73	287
3	204	195	200	152	165	984	286	229	140	132	49	113
4	603	255	200	155	158	830	349	336	182	162	145	219
5	520	198	225	160	155	835	299	223	192	137	82	295
6	430	207	260	160	152	700	185	266	131	136	89	169
7	382	224	360	160	145	607	319	211	92	189	62	103
8	267	205	754	160	155	440	218	237	145	162	133	149
9	257	236	1130	160	158	349	382	311	224	153	59	198
10	237	171	750	155	160	395	524	215	140	106	262	102
11	208	186	620	160	165	390	548	1040	133	136	196	126
12	164	186	530	160	160	380	548	2370	129	63	110	142
13	159	181	440	160	158	374	576	1690	202	67	121	62
14	161	187	380	160	155	354	920	1240	115	149	121	60
15	299	236	340	160	155	313	1040	1030	170	49	77	91
16	291	181	320	160	175	294	689	906	275	79	111	90
17	367	202	260	155	190	359	682	618	376	52	94	133
18	701	220	230	155	890	207	659	543	339	130	71	212
19	598	252	200	160	2530	350	622	488	299	56	97	223
20	530	196	175	160	3420	183	501	351	332	61	129	179
21	380	179	160	160	2960	202	396	418	133	65	67	166
22	436	222	155	160	2820	217	397	273	186	59	57	294
23	349	133	150	158	3860	215	416	298	338	79	48	230
24	359	135	140	155	3950	271	418	192	215	147	48	211
25	366	204	125	158	2990	216	394	287	306	98	98	200
26	318	178	135	160	1760	209	345	234	251	42	61	252
27	362	167	140	160	1340	392	341	233	200	45	99	355
28	308	140	125	160	1380	256	381	261	147	51	77	585
29	301	206	135	160	---	257	342	252	125	175	119	358
30	277	145	160	158	---	243	334	264	199	73	120	334
31	248	---	150	155	---	333	---	119	---	50	162	---
TOTAL	10421	5904	9297	4916	30624	13815	13756	15819	6132	3163	3187	6181
MEAN	336	197	300	159	1094	446	459	510	204	102	103	206
MAX	701	274	1130	165	3950	1530	1040	2370	376	189	262	585
MIN	159	133	125	152	145	183	185	119	92	42	48	60
CFSM	.86	.51	.77	.41	2.81	1.14	1.18	1.31	.52	.26	.26	.53
IN.	.99	.56	.89	.47	2.92	1.32	1.31	1.51	.58	.30	.30	.59

CAL YR 1980 TOTAL 94403 MEAN 258 MAX 2120 MIN 11 CFSM .66 IN 9.00
WTR YR 1981 TOTAL 123215 MEAN 338 MAX 3950 MIN 42 CFSM .87 IN 11.75

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW¼ NE¼ sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft (610 m) downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi (1.1 km) upstream from Bullock Creek, 1.4 mi (2.3 km) downstream from Chippewa River and 23 mi (37 km) upstream from mouth.

DRAINAGE AREA.--2,400 mi² (6,200 km²), approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft (176.869 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1955, at datum 10.00 ft (3.048 m) higher.

REMARKS.--Records good except those for the winter period, which are poor. Water is diverted from river a short distance above station for industrial use. Small part returned to river 0.25 mi (0.4 km) below station, remainder returned 1 mi (1.6 km) below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft³/s (113 m³/s) regulated by dam 2,000 ft (610 m) above station; fixed crest dam since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--45 years, 1,652 ft³/s (46.78 m³/s), 9.35 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft³/s (963 m³/s) Mar. 21, 1948, gage height, 29.50 ft (8.992 m); minimum, 39 ft³/s (1.10 m³/s) Oct. 1, 1942; minimum daily, 111 ft³/s (3.14 m³/s) Aug. 21, 1949; minimum gage height, 9.04 ft (2.755 m) Aug. 19, 1954, caused by bridge construction above station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft (9.05 m) Mar. 28, 1916, discharge, 34,800 ft³/s (986 m³/s), from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 7,000 ft³/s (198 m³/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft³/s)	(m³/s)	(ft)	(m)			(ft³/s)	(m³/s)	(ft)	(m)
Dec. 9	2000	7360	208	17.31	5.276	Apr. 30	0500	9020	255	19.02	5.797
Feb. 24	1930	*12200	346	*21.99	6.703	May 12	2230	11000	312	21.03	6.410

Minimum discharge, 224 ft³/s (6.34 m³/s) Aug. 25, gage height, 9.21 ft (2.807 m); minimum daily, 257 ft³/s (7.28 m³/s) Aug. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1110	1000	1160	670	480	7280	2590	4490	813	788	380	1120
2	1030	779	1500	855	790	6180	2510	3900	914	906	373	1100
3	1250	1310	1220	585	1110	5100	2400	3620	872	543	440	740
4	1350	1460	1380	560	890	4750	2090	3440	718	468	669	1220
5	1820	1450	1600	720	790	4430	1350	3360	846	466	480	757
6	2140	1690	1090	1130	615	4280	1790	2180	512	775	465	623
7	2320	1690	1220	1270	510	4090	2070	2040	422	677	560	459
8	1900	1110	3980	1210	460	2320	1910	1980	687	637	401	986
9	1480	794	7030	1160	680	2460	4310	1180	916	772	354	1090
10	1140	1340	6960	695	900	2910	6310	884	805	735	747	794
11	754	1400	5050	490	920	3110	6070	3740	799	407	863	787
12	660	1310	3850	750	1220	3280	4860	9970	619	305	754	462
13	773	1330	2010	830	1470	3010	4520	10100	464	443	707	360
14	965	1450	1130	840	735	2750	5390	7060	485	524	575	568
15	1390	1160	1260	855	470	1750	6710	5330	689	458	397	461
16	2180	1110	1440	830	530	2030	5710	4550	1420	457	336	490
17	2840	1570	1360	640	1240	2560	5010	2370	1750	379	703	1070
18	3600	1830	1240	550	2250	2390	4390	2160	1640	340	672	1220
19	3050	1970	1280	800	6910	2310	3090	2440	1370	293	696	664
20	2660	1990	730	900	10000	2220	2980	2140	817	320	723	481
21	2570	1800	560	900	11100	1500	2750	2060	655	488	648	1070
22	2540	1140	740	860	10600	992	2600	1460	1290	536	328	1390
23	2340	778	940	880	10600	1800	2650	884	2120	561	257	1180
24	1840	1060	1080	650	11900	2130	2920	674	1970	502	382	1040
25	1410	1580	700	530	11400	2180	2860	727	1300	350	425	1230
26	1190	1780	815	740	8950	2140	2920	1150	1210	271	394	1420
27	1590	1030	615	960	6360	2330	2590	1550	699	372	436	1090
28	1740	1200	505	1050	6680	1440	3410	1800	520	442	517	2060
29	1690	924	730	1020	---	1060	7750	1640	802	703	1700	1780
30	1480	797	1320	1010	---	1720	7990	728	763	647	1180	1610
31	1610	---	1440	580	---	2550	---	570	---	461	1210	---
TOTAL	54412	39832	55935	25520	110560	89052	114500	90177	28887	16026	18772	29322
MEAN	1755	1328	1804	823	3949	2873	3817	2909	963	517	606	977
MAX	3600	1990	7030	1270	11900	7280	7990	10100	2120	906	1700	2060
MIN	660	778	505	490	460	992	1350	570	422	271	257	360
†	28.9	34.2	32.7	22.8	20.6	26.6	24.0	21.5	24.1	35.1	31.8	35.0
MEAN‡	1784	1362	1837	846	3970	2900	3841	2930	987	552	638	1012
CFSM‡	.74	.57	.77	.35	1.65	1.21	1.60	1.22	.41	.23	.27	.42
IN‡	.86	.63	.88	.41	1.72	1.39	1.79	1.41	.46	.27	.31	.47

CAL YR 1980 TOTAL 538280 MEAN 1471 MAX 7030 MIN 360 MEAN‡ 1499 CFSM‡ .62 IN‡ 8.50
WTR YR 1981 TOTAL 672995 MEAN 1844 MAX 11900 MIN 257 MEAN‡ 1872 CFSM‡ .78 IN‡ 10.60

† Diversion in cubic feet per second, for industrial use; furnished by Dow Chemical Co.
‡ Adjusted for diversion made by Dow Chemical Co.

04157000 SAGINAW RIVER AT SAGINAW, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°24'46", long 83°57'47", in NW¼ SE¼ sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft (305 m) downstream from bridge on Rust Avenue in Saginaw, 1.9 mi (3.1 km) downstream from Tittabawassee River and 20.3 mi (32.7 km) upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue. Water-quality monitor located 1,000 ft (305 m) downstream on downstream side of bridge on Court Street.

DRAINAGE AREA.--6,060 mi² (15,700 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084: December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft (172.246 m), International Great Lakes datum. Prior to Oct. 1, 1972, nonrecording gage at site 1.9 mi (3.1 km) downstream at same datum. Auxiliary water-stage recorder on right bank near Aplin Beach, 19.9 mi (32.0 km) downstream.

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft³/s (1,930 m³/s) Mar. 30, 1904, gage height, 24.9 ft (7.59 m), site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 30,800 ft³/s (872 m³/s) Feb. 21; maximum daily gage height, 18.72 ft (5.706 m) Feb. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1			---		---	18900	---	11300				---
2			---		---	17700	---	---				---
3			---		---	16800	---	---				---
4			---		---	14200	---	---				---
5			---		---	12800	---	---				---
6			---		---	11600	---	---				---
7			---		---	10700	---	---				10000
8			---		---	---	---	---				---
9			11500		---	---	---	---				10300
10			12800		---	---	---	---				---
11			12400		---	---	---	13900				---
12			11500		---	---	11000	19500				---
13			10600		---	---	10800	24400				---
14			---		---	---	10600	24700				---
15			---		---	---	14700	20900				---
16			---		---	---	14900	17000				---
17			---		---	---	13300	13600				---
18			---		12800	---	11500	10400				---
19			---		18100	---	10000	---				---
20			---		26200	---	---	---				---
21			---		30800	---	---	---				---
22			---		30200	---	---	---				---
23			---		30200	---	---	---				---
24			---		29000	---	---	---				---
25			---		28200	---	---	---				---
26			---		26700	---	---	---				---
27			---		23100	---	---	---				11200
28			---		20200	---	---	---				10400
29			---		---	---	10700	---				11600
30			---		---	---	11400	---				---
31			---		---	---	---	---				---

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981 (discontinued).
WATER TEMPERATURES: November 1974 to September 1981 (discontinued).

INSTRUMENTATION.--Water-quality monitor November 1976 to September 1981 (discontinued).

REMARKS.--Interruptions in the daily record were due to malfunctions of the instrument. Instantaneous water-discharge measurements are made at times of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.
WATER TEMPERATURES: Maximum, 30.0°C July 10, 14, 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 23...	1430	5270	695	8.2	8.5	8.8	75	180	72	290	92	79
NOV 20...	1100	4390	758	8.2	2.5	11.9	89	200	K16	300	87	84
DEC 24...	1100	--	950	8.0	.0	10.7	73	610	110	400	140	110
JAN 14...	0900	--	918	7.7	.0	8.7	60	110	K13	330	71	88
FEB 10...	1000	--	919	7.8	.0	9.2	64	K1000	82	360	99	96
27...	0930	23400	440	7.6	.0	10.8	74	250	420	170	47	48
APR 15...	1400	14900	538	7.8	10.5	9.1	81	F340	K1800	220	64	61
MAY 13...	1300	26000	416	8.4	10.0	9.0	80	4200	7400	190	44	51
JUN 10...	1430	-1370	535	7.9	21.5	7.4	86	K61	K22	280	81	75
JUL 15...	0930	-909	691	8.0	26.0	7.3	90	410	K49	320	140	82
AUG 03...	1530	1590	596	8.5	27.0	13.6	170	96	K30	270	72	70
SEP 17...	1230	3600	--	7.4	17.5	8.5	88	1600	2100	270	90	73

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 23...	23	27	17	.7	4.1	3.1	260	0	200	2.5	63
NOV 20...	22	39	22	1.0	3.3	2.5	260	0	210	2.6	64
DEC 24...	30	50	21	1.1	4.2	3.1	320	0	260	5.1	79
JAN 14...	27	49	24	1.2	4.5	3.4	330	0	270	10	73
FEB 10...	29	61	27	1.4	3.7	2.8	310	0	250	8.0	70
27...	13	12	13	.4	4.2	3.1	150	0	120	6.4	37
APR 15...	17	18	15	.5	2.8	2.1	190	0	160	4.6	42
MAY 13...	14	12	12	.4	3.3	2.5	170	4	150	1.0	39
JUN 10...	22	46	26	1.2	3.8	2.8	240	0	200	4.7	49
JUL 15...	27	90	38	2.2	5.1	3.8	220	0	180	3.7	67
AUG 03...	22	62	33	1.7	3.8	2.8	220	8	190	1.0	52
SEP 17...	22	31	20	.8	3.6	--	220	0	180	14	55

04157005 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 21...	68	.2	8.7	444	402	6320	4.1	4.1	.170	.170	.22
NOV 20...	81	.2	3.7	478	432	9670	1.4	1.4	.320	.230	.39
DEC 26...	120	.3	8.4	600	573	--	2.8	2.8	.860	.750	1.0
JAN 14...	96	.6	9.9	550	512	--	1.9	1.8	1.40	1.30	1.7
FEB 10...	138	<.1	11	507	557	--	1.4	.03	.910	.110	--
27...	37	.1	5.7	269	241	14700	2.6	2.4	.230	.230	--
APR 15...	48	.2	5.0	328	284	13200	1.7	1.7	.140	.120	--
MAY 13...	29	.2	5.2	293	244	20600	3.3	3.2	.220	.180	--
JUN 10...	89	.3	1.7	401	409	-1700	.93	.86	.270	.270	--
JUL 15...	160	.3	3.5	623	555	-1530	1.3	1.3	.140	.140	--
AUG 03...	110	.3	1.7	516	441	2220	.57	.57	.030	.030	--
SEP 17...	64	.3	4.7	414	373	4020	1.6	1.6	.240	.240	--

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 21...	.83	1.00	5.1	23	.110	.34	.040	--	36	512	100
NOV 20...	.43	.75	2.2	9.7	.110	.34	.040	13	17	142	100
DEC 26...	.54	1.40	4.2	19	.080	.25	.050	--	--	--	--
JAN 14...	.40	1.80	3.7	16	.100	.31	.070	8.4	--	--	--
FEB 10...	.69	1.60	2.8	12	.130	.40	.100	--	3	--	100
27...	.72	.95	3.6	16	.100	.31	.060	--	37	2340	100
APR 15...	1.2	1.30	3.0	13	.300	.92	.030	16	150	6360	100
MAY 13...	1.4	1.60	4.9	22	.220	.67	.070	18	102	7160	100
JUN 10...	1.1	1.40	2.3	10	.170	.52	.040	--	41	-152	100
JUL 15...	1.5	1.60	2.9	13	.170	.52	.060	12	30	-74	100
AUG 03...	1.3	1.30	1.9	8.4	.200	.61	.030	11	30	146	100
SEP 17...	1.1	1.30	2.9	13	.170	.52	.070	--	30	292	100

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT											
23...	1430	3	2	200	70	1	1	10	<10	0	0
DEC											
24...	1100	1	1	100	60	1	1	10	<10	0	0
FEB											
27...	0930	1	0	100	100	0	0	20	10	1	0
JUN											
10...	1430	1	1	100	40	2	2	20	10	1	0
SEP											
17...	1230	4	4	100	<50	1	1	10	<10	1	<1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT										
23...	6	4	920	50	6	1	50	20	.5	.4
DEC										
24...	15	2	350	30	4	0	70	50	.3	.2
FEB										
27...	27	6	760	100	21	0	50	20	<.1	<.1
JUN										
10...	5	2	1300	10	10	0	100	10	<.1	<.1
SEP										
17...	47	3	950	40	8	6	70	10	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT										
23...	30	2	0	0	0	0	60	60	8.7	1.4
DEC										
24...	52	2	0	0	0	0	30	20	10	.9
FEB										
27...	4	2	0	0	0	0	80	10	13	3.6
JUN										
10...	12	5	0	0	0	0	40	20	14	1.6
SEP										
17...	6	4	<1	<1	<1	<1	70	20	9.4	1.0

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 20,80	FEB 27,81	MAY 13,81	JUN 10,81
TIME	1100	0930	1300	1430
TOTAL CELLS/ML	5800	2100	9100	37000
DIVERSITY: DIVISION	1.5	0.4	1.6	1.4
.CLASS	1.5	0.4	1.7	1.4
..ORDER	2.0	0.6	2.4	2.0
...FAMILY	2.6	0.7	3.1	2.5
....GENUS	2.6	1.2	3.4	3.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....TETRAEDRON	--	-	13	1	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	1200#	21	--	-	800	9	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	200	3	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	75	1	--	-	210	2	190	1
....CHODATELLA	--	-	--	-	*	0	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	1900	5
....QUADRIGULA	--	-	--	-	--	-	570	2
....SELENASTRUM	--	-	--	-	--	-	190	1
....TREUBARIA	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	140	2	570	2
....COELASTRUM	--	-	--	-	840	9	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	400	7	--	-	420	5	5700#	16
....TETRASTRUM	--	-	--	-	--	-	570	2
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	75	1	39	2	140	2	1100	3
....CHLOROGONIUM	--	-	--	-	--	-	190	1
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
...VOLVOCACEAE								
....PANDORINA	--	-	--	-	--	-	2300	6
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	700	12	13	1	1000	11	11000#	29
....MELOSIRA	--	-	--	-	140	2	6900#	19
....SKELETONEMA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	75	1	--	-	140	2	190	1
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	140	2	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	*	0	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	*	0	190	1
...FRAGILARIACEAE								
....ASTERIONELLA	50	1	--	-	*	0	770	2
....FRAGILARIA	--	-	26	1	--	-	--	-
....SYNEDRA	50	1	--	-	*	0	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	*	0	13	1	*	0	--	-
...NAVICULACEAE								
....NAVICULA	*	0	39	2	520	6	190	1
...NITZSCHIACEAE								
....NITZSCHIA	150	3	13	1	420	5	1300	4
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	190	1
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...DINOBRYACEAE								
....DINOBRYON	--	-	--	-	70	1	--	-
...SYNURACEAE								
....MALLOMONAS	--	-	--	-	100	1	--	-

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 20,80		FEB 27,81		MAY 13,81		JUN 10,81	
TIME	1100		0930		1300		1430	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	770	2
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	350	6	26	1	*	0	1500	4
....COCCOCHLORIS	--	-	--	-	--	-	--	-
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	870	10	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	1700#	78	--	-	--	-
....OSCILLATORIA	2400#	41	--	-	2800#	31	--	-
....PHORMIDIUM	--	-	280	13	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	*	0	--	-	*	0	380	1

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 15,81	AUG 3,81	SEP 17,81
TIME	0930	1530	1230
TOTAL CELLS/ML	46000	110000	16000
DIVERSITY: DIVISION	1.5	1.5	1.3
.CLASS	1.5	1.5	1.3
..ORDER	2.0	2.1	1.6
...FAMILY	2.8	3.0	1.7
....GENUS	3.6	3.2	2.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....TETRAEDRON	--	-	--	-	--	-
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	2500	6	1800	2	--	-
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	3100	3	--	-
...MICRACTINIACEAE						
....MICRACTINIUM	4300	9	22000*	21	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	1200	3	--	-	--	-
....CHODATELLA	--	-	890	1	--	-
....KIRCHNERIELLA	580	1	--	-	--	-
....OOCYSTIS	780	2	--	-	--	-
....QUADRIGULA	--	-	--	-	--	-
....SELENASTRUM	*	0	890	1	--	-
....TREUBARIA	*	0	--	-	--	-
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	890	1	--	-
...SCENEDESMACEAE						
....ACTINASTRUM	--	-	--	-	--	-
....COELASTRUM	4300	9	--	-	--	-
....CRUCIGENIA	3900	9	1300	1	--	-
....SCENEDESMUS	2700	6	16000	15	9200*	57
....TETRASTRUM	1600	3	--	-	250	2
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	1400	3	2700	3	--	-
....CHLOROGONIUM	--	-	--	-	--	-
...PHACOTACEAE						
....PHACOTUS	--	-	890	1	--	-
...VOLVOCACEAE						
....PANDORINA	--	-	7100	7	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	9300*	20	23000*	22	2200	13
....MELOSIRA	780	2	--	-	1200	8
....SKELETONEMA	--	-	2700	3	--	-
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	190	1
...CYMBELLACEAE						
....CYMBELLA	--	-	--	-	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	310	2
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	--	-	--	-
...NAVICULACEAE						
....NAVICULA	--	-	--	-	370	2
...NITZSCHIACEAE						
....NITZSCHIA	780	2	890	1	430	3
...SURIRELLACEAE						
....SURIRELLA	--	-	--	-	--	-
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...DINOBRYACEAE						
....DINOBRYON	--	-	--	-	--	-
...SYNURACEAE						
....MALLOMONAS	--	-	--	-	--	-

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 15,81		AUG 3,81		SEP 17,81	
TIME	0930		1530		1230	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	*	0	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	*	0	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	9300	9	--	-
....ANACYSTIS	6000	13	--	-	2000	12
....COCCOCHLORIS	--	-	*	0	--	-
..NOSTOCALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	--	-
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	--	-
....OSCILLATORIA	4800	11	11000	11	--	-
....PHORMIDIUM	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	*	0	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	ONCE-DAILY	MAX	MIN	MEAN
		OCTOBER			NOVEMBER		DEC		JANUARY	
1	923	907	914	818	778	794	---			
2	978	915	942	792	780	784	---			
3	990	955	968	790	762	778	---			
4	951	931	945	810	766	790	790			
5	923	910	914	776	760	768	---			
6	915	890	899	763	727	755	---			
7	882	854	870	---	---	---	---			
8	845	821	835	765	749	753	---			
9	817	805	809	---	---	---	---			
10	797	777	786	762	754	758	---			
11	781	769	774	772	740	764	634			
12	776	764	771	770	714	754	---			
13	772	760	764	774	698	758	---			
14	772	752	758	790	746	770	---			
15	772	764	768	798	750	786	---			
16	760	724	744	802	758	786	---			
17	735	707	723	---	---	---	---			
18	731	703	717	872	824	848	---			
19	727	711	718	---	---	---	---			
20	711	702	708	---	---	---	---			
21	710	690	699	---	---	---	---			
22	718	686	701	---	---	---	---			
23	751	710	731	---	---	---	---			
24	732	625	680	---	---	---	---			
25	777	698	744	---	---	---	---			
26	775	765	768	---	---	---	---			
27	778	760	771	---	---	---	---			
28	767	756	763	---	---	---	---			
29	770	747	755	---	---	---	---			
30	790	736	759	---	---	---	---			
31	795	767	783	---	---	---	---			
MONTH	990	625	790							

DAY	ONCE-DAILY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEB	MAR		APRIL			MAY	
1	---	---	---	---	---	600	591	595
2	---	---	---	---	---	612	593	600
3	---	---	---	---	---	608	590	600
4	---	543	---	---	---	626	604	616
5	---	619	---	---	---	623	610	616
6	---	---	---	---	---	627	590	609
7	---	564	---	---	---	606	520	594
8	---	---	---	---	---	581	494	569
9	---	---	---	---	---	557	458	531
10	---	---	---	---	---	555	534	548
11	---	602	---	---	---	523	501	514
12	---	---	---	---	---	471	381	449
13	---	---	---	---	---	402	385	393
14	---	---	---	---	---	429	379	419
15	---	---	---	---	---	457	437	446
16	---	---	545	528	536	477	461	467
17	---	---	561	548	556	513	502	507
18	---	---	584	572	579	552	538	546
19	---	---	597	589	593	600	588	593
20	---	---	620	614	617	605	592	599
21	332	650	632	614	625	624	608	616
22	---	---	631	622	627	639	624	632
23	---	---	622	610	616	651	635	644
24	---	---	628	612	617	687	646	674
25	---	---	628	621	624	690	663	673
26	---	---	627	613	619	693	673	680
27	---	647	619	612	615	---	---	---
28	---	---	616	607	612	---	---	---
29	---	---	608	600	602	---	---	---
30	---	---	597	593	596	---	---	---
31	---	---	---	---	---	---	---	---

STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	ONCE-DAILY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUN	JUL	AUGUST			SEPTEMBER		
1	---	---	---	---	---	639	593	616
2	---	---	---	---	---	627	590	605
3	728	---	---	---	---	683	593	623
4	---	---	---	---	---	662	619	642
5	---	---	---	---	---	651	488	560
6	---	---	---	---	---	486	432	467
7	749	---	---	---	---	430	409	417
8	---	664	---	---	---	484	407	427
9	---	---	---	---	---	534	489	515
10	---	---	---	---	---	561	521	544
11	---	709	---	---	---	597	550	568
12	---	---	---	---	---	628	596	610
13	---	---	---	---	---	628	601	611
14	---	---	---	---	---	676	620	636
15	---	---	---	---	---	732	650	685
16	---	806	---	---	---	764	654	701
17	---	---	---	---	---	732	622	668
18	---	758	809	684	760	672	600	620
19	---	---	811	753	774	667	620	653
20	---	---	791	741	756	659	605	619
21	---	---	785	690	734	667	628	645
22	---	---	757	698	734	739	641	683
23	670	---	752	705	732	658	624	640
24	---	---	752	726	741	671	641	658
25	---	797	739	719	731	671	654	666
26	---	---	868	738	842	682	632	658
27	---	---	900	862	881	622	481	555
28	662	---	889	711	811	540	462	490
29	---	---	793	683	700	549	486	517
30	710	---	830	553	630	538	510	525
31	---	686	607	567	589	---	---	---
MONTH						764	407	594

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	ONCE-DAILY	ONCE-DAILY
	OCTOBER			NOVEMBER			DEC	JAN
1	17.0	15.5	16.0	5.0	5.0	5.0	---	.0
2	17.0	16.5	16.5	5.0	5.0	5.0	---	---
3	16.5	14.5	16.0	5.5	5.0	5.5	---	---
4	14.0	12.0	12.5	7.0	6.0	6.5	.0	.0
5	12.0	11.0	11.5	7.0	6.0	6.5	---	---
6	11.0	10.0	10.0	6.0	5.0	5.5	---	---
7	11.0	9.5	10.0	6.0	5.5	6.0	---	---
8	11.5	10.5	11.0	6.0	5.5	6.0	2.5	---
9	12.0	11.5	12.0	6.5	6.0	6.0	---	---
10	12.0	11.5	12.0	6.0	5.5	6.0	---	---
11	12.0	11.5	11.5	5.5	4.5	5.0	.0	.0
12	11.5	10.0	11.0	4.5	3.5	4.0	---	---
13	10.0	9.5	9.5	4.0	3.5	3.5	.0	---
14	9.5	8.5	9.0	---	---	---	.0	---
15	9.0	9.0	9.0	4.5	4.5	4.5	---	---
16	10.5	9.5	9.5	---	---	---	---	---
17	12.0	10.5	11.0	4.5	3.5	4.0	---	---
18	11.5	10.5	11.0	---	---	---	---	.0
19	10.5	10.0	10.0	2.5	2.0	2.0	---	---
20	10.0	9.5	9.5	---	---	---	---	---
21	9.5	9.0	9.5	---	---	---	.0	---
22	9.5	8.5	9.0	---	---	---	---	---
23	11.0	8.0	8.5	---	---	---	---	---
24	9.0	7.5	8.0	---	---	---	---	---
25	9.0	8.0	8.5	---	---	---	---	.0
26	8.0	6.5	7.5	---	---	---	---	---
27	6.5	5.5	6.0	---	---	---	---	---
28	6.0	5.5	5.5	---	---	---	.0	---
29	5.5	5.0	5.0	---	---	---	---	---
30	5.0	4.5	4.5	---	---	---	---	---
31	5.0	5.0	5.0	---	---	---	---	---
MONTH	17.0	4.5	10.0					

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	ONCE-DAILY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEB	MAR	APRIL			MAY		
1	.0	---	---	---	---	13.0	12.0	12.5
2	---	---	---	---	---	14.0	12.0	13.0
3	---	---	---	---	---	14.5	12.5	13.5
4	---	2.0	---	---	---	16.5	10.0	15.0
5	---	---	---	---	---	17.0	10.5	16.0
6	---	---	---	---	---	16.0	11.5	15.0
7	---	1.5	---	---	---	16.5	11.5	15.0
8	.0	---	---	---	---	17.0	10.0	15.5
9	---	---	---	---	---	18.0	10.0	16.5
10	---	---	---	---	---	18.0	10.5	15.5
11	---	3.0	---	---	---	14.5	9.0	12.0
12	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---
14	---	3.5	---	---	---	12.0	12.0	12.0
15	.0	---	---	---	---	12.0	12.0	12.0
16	---	---	12.0	10.5	11.5	14.0	12.0	13.0
17	---	---	14.0	12.0	12.5	15.0	13.0	14.0
18	---	---	14.5	13.0	14.0	15.0	13.5	14.5
19	---	1.0	14.0	13.0	13.5	16.5	14.0	15.0
20	---	---	13.0	12.0	12.5	18.5	12.0	16.5
21	.0	2.0	12.5	11.0	11.5	19.5	17.0	18.0
22	---	---	12.5	11.0	12.0	21.5	18.5	19.5
23	---	---	12.5	11.5	12.0	---	---	---
24	---	---	11.5	10.5	11.0	22.5	14.0	21.5
25	---	---	---	---	---	22.5	13.5	21.5
26	---	---	---	---	---	---	---	---
27	---	7.0	---	---	---	---	---	---
28	---	---	12.5	11.5	12.5	---	---	---
29	---	---	12.5	11.5	12.0	---	---	---
30	---	---	12.5	11.0	12.0	---	---	---
31	---	---	---	---	---	---	---	---
MONTH								

DAY	ONCE-DAILY	ONCE-DAILY	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUN	JUL	AUGUST			SEPTEMBER		
1	---	---	---	---	---	24.5	23.5	24.0
2	---	---	---	---	---	25.0	23.0	24.0
3	22.0	---	---	---	---	23.0	22.5	23.0
4	---	---	---	---	---	23.0	21.0	22.0
5	---	---	---	---	---	21.0	20.0	20.5
6	---	---	---	---	---	20.0	19.5	20.0
7	23.5	---	---	---	---	20.0	19.5	19.5
8	---	28.0	---	---	---	20.5	19.5	20.0
9	---	---	---	---	---	20.0	19.0	19.5
10	---	---	---	---	---	20.5	19.0	19.5
11	---	27.0	---	---	---	22.0	20.0	21.0
12	---	---	---	---	---	22.5	21.0	22.0
13	21.0	---	---	---	---	22.5	21.5	22.0
14	---	---	---	---	---	22.5	22.0	22.5
15	---	---	---	---	---	22.5	21.5	22.0
16	---	25.0	---	---	---	21.5	20.5	21.0
17	---	---	---	---	---	20.5	17.0	18.5
18	---	26.0	24.5	22.5	23.0	17.0	15.5	16.5
19	---	---	24.0	23.0	23.5	16.5	16.0	16.5
20	---	---	24.5	23.0	23.5	16.5	15.5	16.0
21	---	---	25.5	23.0	24.0	16.5	14.5	15.0
22	---	---	25.5	24.0	24.5	14.5	13.5	14.0
23	21.0	---	25.5	24.0	24.5	14.0	13.0	13.5
24	---	---	25.5	24.5	25.0	14.5	13.0	14.0
25	---	24.0	26.0	25.0	25.5	14.5	14.0	14.5
26	---	---	25.5	24.5	25.0	16.5	14.5	15.0
27	---	---	25.0	24.0	24.5	17.0	16.0	16.5
28	22.0	---	24.5	23.5	24.0	16.0	15.0	15.5
29	---	---	24.5	23.5	23.5	15.0	14.0	14.5
30	22.0	---	24.0	23.5	24.0	14.5	13.0	13.5
31	---	23.0	24.5	24.0	24.0	---	---	---
MONTH						25.0	13.0	18.5

04158500 PIGEON RIVER NEAR OWENDALE, MI

LOCATION.--Lat 43°45'49", long 83°14'46", in SW¼ SE¼ sec.36, T.16 N., R.10 E., Huron County, Hydrologic Unit 04080103, on left bank 600 ft (183 m) downstream from bridge on Kilmanagh Road, 2.5 mi (4.0 km) downstream from confluence of East and West Branches, and 2.5 mi (4.0 km) northeast of Owendale.

DRAINAGE AREA.--53.2 mi^2 (138 km^2).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map. Prior to June 10, 1954, nonrecording gage at site 600 ft (183 m) upstream at same datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 32.0 ft^3/s (0.906 m^3/s), 8.17 in/yr (208 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,550 ft^3/s (72.2 m^3/s) Mar. 25, 1954, gage height, 10.75 ft (3.277 m), from rating curve extended above 1,200 ft^3/s (34.0 m^3/s), site and datum then in use; maximum gage height, 10.87 ft (3.313 m) Feb. 19, 1981, backwater from ice; minimim discharge, 0.1 ft^3/s (0.003 m^3/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft^3/s (14.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 19	0700	*885	25.1	*a10.87	3.313
Feb. 24	0100	762	21.6	8.64	2.633
Apr. 29	0600	662	18.7	8.06	2.457
May 12	0500	753	21.3	8.56	2.609

a ice jam.

Minimum discharge, 1.5 ft^3/s (0.042 m^3/s) Aug. 25, gage height, 2.77 ft (0.844 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.9	9.5	14	6.8	8.3	260	37	111	16	8.9	2.5	3.6
2	7.4	9.2	17	6.8	9.0	121	33	73	14	8.4	2.3	3.8
3	14	8.6	20	6.9	8.0	69	27	58	13	7.0	2.7	3.6
4	42	9.3	23	6.9	7.0	55	26	48	12	5.8	2.9	19
5	55	11	22	6.8	6.1	50	25	42	12	8.3	3.0	159
6	40	11	22	6.8	6.0	46	22	39	11	12	2.5	124
7	30	12	47	6.6	6.0	40	20	36	9.7	8.3	3.0	46
8	25	12	147	6.4	6.2	36	18	32	9.8	5.6	3.8	35
9	20	13	330	6.2	6.5	34	74	29	11	4.4	3.7	28
10	16	12	184	6.0	7.0	36	93	39	10	4.1	3.2	24
11	14	11	69	5.8	7.4	40	63	435	9.4	3.8	2.7	24
12	12	9.1	52	5.6	8.0	41	50	644	8.5	3.5	2.8	20
13	11	8.7	38	5.6	8.8	41	40	265	9.1	3.6	2.6	15
14	10	12	26	5.7	10	36	40	108	11	3.3	2.6	12
15	20	14	25	5.8	12	36	44	80	11	2.9	5.3	10
16	31	13	21	6.0	15	33	37	70	10	2.9	5.8	10
17	41	11	18	6.1	100	29	35	60	9.1	3.5	3.8	37
18	47	11	17	6.2	650	25	32	51	7.7	5.7	3.2	69
19	41	11	14	6.2	860	21	28	43	6.5	4.3	2.8	50
20	30	10	11	6.4	800	22	24	39	5.6	3.8	2.6	38
21	24	9.9	9.8	6.5	469	21	21	35	7.4	3.4	2.4	31
22	20	9.3	8.6	6.6	272	21	20	30	14	3.2	2.1	74
23	17	9.0	7.7	6.7	485	23	26	26	20	2.7	2.0	76
24	15	9.6	7.0	6.8	604	24	36	24	18	2.4	2.1	52
25	14	11	6.6	7.0	284	25	37	27	13	2.2	1.9	39
26	15	11	6.5	7.5	152	26	33	25	10	2.5	1.8	40
27	15	10	6.5	9.0	88	35	29	24	7.4	2.4	2.1	193
28	14	12	6.5	9.9	205	36	264	22	5.0	3.5	3.6	343
29	12	15	6.6	8.6	---	35	582	21	4.4	5.7	5.1	94
30	11	15	6.6	8.1	---	36	289	20	8.0	3.9	4.2	38
31	9.9	---	6.7	8.0	---	40	---	18	---	3.1	3.7	---
TOTAL	681.2	330.2	1196.1	210.3	5100.3	1393	2105	2574	313.6	145.1	94.8	1712.0
MEAN	22.0	11.0	38.6	6.78	182	44.9	70.2	83.0	10.5	4.68	3.06	57.1
MAX	55	15	330	9.9	860	260	582	644	20	12	5.8	343
MIN	7.4	8.6	6.5	5.6	6.0	21	18	18	4.4	2.2	1.8	3.6
CFSM	.41	.21	.73	.13	3.42	.84	1.32	1.56	.20	.09	.06	1.07
IN.	.48	.23	.84	.15	3.57	.97	1.47	1.80	.22	.10	.07	1.20

CAL YR 1980 TOTAL 9327.3 MEAN 25.5 MAX 490 MIN 1.7 CFSM .48 IN 6.52
WTR YR 1981 TOTAL 15855.6 MEAN 43.4 MAX 860 MIN 1.8 CFSM .82 IN 11.09

04159010 PIGEON RIVER NEAR CASEVILLE, MI
(National stream-quality network station)

LOCATION.--Lat 43°56'22", long 83°14'30:, in SW¼ NW¼ sec.31, T.18 N., R.11 E., Huron County, Hydrologic Unit 04080103, at bridge on Kinde Road, 1.5 mi (2.4 km) east of Caseville, and 3.1 mi (5.0 km) upstream from mouth.

DRAINAGE AREA.--125 mi² (324 km²).

PERIOD OF RECORD.--January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981 (discontinued).
WATER TEMPERATURES: April 1978 to September 1981 (discontinued).

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements by a local observer. Bi-monthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded, 2,000 micromhos Oct. 20, 1979; minimum daily recorded, 175 micromhos Mar. 6, 1979.
WATER TEMPERATURES: Maximum daily recorded, 27.5°C July 7, 1978; minimum daily recorded, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 21...	1330	72	1060	8.1	7.0	11.0	96	77	K52	520	250	145
NOV 18...	1300	18	882	8.3	1.5	15.7	112	<1	K34	440	150	120
JAN 13...	1330	8.1	917	7.5	.0	7.8	54	112	K8	500	180	142
MAR 03...	1330	211	732	8.1	.0	11.6	81	K19	870	350	150	99
MAY 12...	1330	654	536	7.6	7.0	9.7	81	E18000	K16000	350	170	100
JUL 14...	1130	3.7	586	7.7	21.5	6.8	77	380	160	420	170	110
SEP 16...	1330	22	806	7.8	16.0	8.5	87	K2700	300	550	250	150

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT 21...	38	16	6	.3	5.3	4.0	330	0	270	4.5	140
NOV 18...	33	24	11	.5	4.8	3.6	340	0	280	2.8	140
JAN 13...	36	21	8	.4	3.4	2.5	390	0	320	20	150
MAR 03...	26	9.6	6	.2	4.0	3.0	240	0	200	3.1	79
MAY 12...	25	14	8	.3	4.4	3.3	220	0	180	9.8	72
JUL 14...	36	19	9	.4	2.8	2.1	310	0	250	9.7	120
SEP 16...	42	17	6	.3	1.9	--	370	0	300	9.3	130

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
21...	80	.2	7.2	731	661	142	16	15	.040	.040	.05
NOV											
18...	69	.2	1.1	--	585	28.4	4.2	4.1	.060	.040	.07
JAN											
13...	50	.3	10	671	618	14.6	2.9	2.9	.240	.240	.31
MAR											
03...	45	.2	5.8	487	428	277	9.0	8.8	.240	.120	--
MAY											
12...	51	.2	6.3	531	451	938	16	13	.340	.300	--
JUL											
14...	54	.2	4.5	599	503	6.0	.77	.77	.050	.050	--
SEP											
16...	66	.3	7.5	613	633	36.4	8.0	8.0	.040	.040	--

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
21...	.77	.81	17	74	.060	.18	.040	--	15	2.9	100
NOV											
18...	.41	.47	4.7	21	.070	.21	.060	7.8	13	.63	100
JAN											
13...	.34	.58	3.5	15	.070	.21	.060	--	27	.59	100
MAR											
03...	.52	.76	9.8	43	.100	.31	.070	--	14	8.0	100
MAY											
12...	1.3	1.60	18	78	.220	.67	.150	4.0	43	76	100
JUL											
14...	.80	.85	1.6	7.2	.100	.31	.100	--	7	.07	100
SEP											
16...	.62	.66	8.7	38	.070	.21	.060	--	38	2.3	100

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 21...	1330	2	2	100	70	0	0	20	10	0	0
JAN 13...	1330	2	1	100	70	<1	<1	10	<10	2	0
MAR 03...	1330	0	0	100	100	0	0	10	10	0	0
JUL 14...	1130	4	4	100	50	1	1	20	10	2	1
SEP 16...	1330	3	3	100	100	1	1	20	10	1	<1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 21...	4	4	310	20	2	0	20	6	.5	<.1
JAN 13...	0	0	190	<10	0	0	50	30	.2	.1
MAR 03...	4	2	500	90	3	2	30	10	<.1	<.1
JUL 14...	3	2	180	<10	9	1	60	40	<.1	<.1
SEP 16...	3	3	260	40	3	3	30	20	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 21...	3	1	2	2	0	0	30	20	6.7	.4
JAN 13...	5	5	0	0	0	0	50	10	8.3	.2
MAR 03...	5	1	2	2	0	0	160	60	8.1	.6
JUL 14...	18	1	1	1	0	0	30	<4	9.0	.3
SEP 16...	4	3	1	1	<1	<1	60	10	6.5	.2

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

	NOV 18,80	MAR 3,81	MAY 12,81	JUL 14,81	SEP 16,81
DATE	NOV 18,80	MAR 3,81	MAY 12,81	JUL 14,81	SEP 16,81
TIME	1300	1330	1330	1130	1330
TOTAL CELLS/ML	1100	1800	1400	350	1100
DIVERSITY: DIVISION	1.6	0.1	1.7	1.5	1.5
.CLASS	1.6	0.1	1.7	1.5	1.5
..ORDER	2.3	0.1	2.2	2.2	2.2
...FAMILY	3.0	0.1	3.0	2.8	2.4
....GENUS	3.0	0.1	3.0	2.9	2.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	39	4	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	39	4	--	-	170	12	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	13	1	13	4	14	1
....OOCYSTIS	--	-	--	-	13	1	--	-	--	-
....SELENASTRUM	64	6	--	-	39	3	13	4	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	52	4	--	-	55	5
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	150	14	--	-	300#	22	52	15	190#	17
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	100	10	--	-	--	-	65#	19	510#	45
....STEPHANODISCUS	--	-	--	-	26	2	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	13	1	--	-	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	26	2	--	-	--	-	13	4	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	26	2	--	-	--	-
...NAVICULACEAE										
....NAVICULA	220#	20	--	-	140	10	65#	19	28	2
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	250#	18	65#	19	180#	16
...SURIRELLACEAE										
....SURIRELLA	260#	24	--	-	26	2	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	13	1	--	-	96	8
...CRYPTOMONADACEAE										
....CRYPTOMONAS	77	7	--	-	--	-	13	4	14	1
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	90	8	--	-	280#	21	--	-	--	-
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	1800#	99	--	-	--	-	41	4
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	13	1	--	-	13	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..DINOKONTAE										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	52	15	14	1

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
  * - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1050	1160	952	---	953	---	---	876	---	---	713	---
2	---	1050	---	931	---	---	---	---	---	---	---	---
3	1060	---	---	837	---	937	---	912	---	---	---	---
4	1080	1020	---	921	1060	800	---	846	---	---	---	---
5	1020	1040	1040	936	---	---	---	---	831	---	686	---
6	---	1040	---	932	---	849	892	---	---	---	---	---
7	---	---	---	---	---	---	---	936	---	---	702	---
8	---	1180	---	---	---	910	876	---	---	915	686	934
9	---	---	---	---	---	---	894	---	---	712	671	1000
10	1120	1200	868	---	---	---	834	910	---	858	676	---
11	1060	1110	1200	---	---	889	684	912	806	---	686	---
12	1060	1160	1120	693	---	823	---	---	---	---	686	---
13	1060	1090	799	982	---	---	---	---	---	---	686	---
14	958	---	---	---	953	---	---	---	---	---	696	1050
15	1060	---	1480	975	---	---	896	---	764	---	629	---
16	1040	---	1070	---	---	919	---	---	832	---	690	900
17	1040	994	1110	957	---	939	---	850	811	---	686	889
18	---	996	1030	---	---	757	894	---	811	---	634	---
19	975	996	1230	---	---	---	---	915	806	796	645	998
20	---	---	1210	---	---	---	894	---	---	754	666	---
21	1080	998	---	---	---	---	887	---	764	727	686	---
22	863	---	---	---	---	---	---	---	---	718	686	978
23	999	---	1230	---	---	915	---	---	---	723	707	983
24	857	---	---	---	---	894	914	---	---	688	722	967
25	---	944	---	---	---	907	---	---	853	---	723	978
26	---	---	---	---	---	889	841	---	---	706	748	965
27	1170	851	---	---	---	907	755	---	---	686	733	801
28	1210	980	978	---	---	---	705	---	854	707	588	---
29	---	---	1110	728	---	930	---	---	---	706	---	---
30	1210	988	---	---	---	912	853	---	931	---	---	---
31	---	---	1060	---	---	912	---	---	---	723	875	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	4.0	.0	---	.0		11.0	9.0	---	---	---	---
2	---	3.0	---	---	.0		---	11.0	---	---	---	---
3	9.0	---	.0	.0	.0		---	14.0	---	---	---	---
4	4.0	---	.0	.0	.0		---	---	---	---	---	---
5	3.0	4.0	.0	.0	.0		---	---	---	---	20.0	---
6	4.0	1.0	---	.0	.0		---	---	---	23.0	19.0	---
7	---	3.0	---	.0	---		---	---	---	---	21.0	---
8	---	4.0	.0	.0	.0		---	---	---	---	20.0	18.0
9	---	---	---	.0	.0		---	---	---	---	20.0	13.0
10	---	---	.0	.0	.0		15.0	9.0	---	20.0	---	---
11	---	---	---	.0	.0		15.0	7.0	20.0	---	22.0	---
12	7.0	---	---	.0	.0		11.0	---	---	---	22.0	---
13	6.0	---	---	.0	.0		---	---	---	---	23.0	---
14	---	---	---	.0	.0		9.0	---	---	---	22.5	20.0
15	---	---	.0	.0	.0		---	---	---	---	21.0	---
16	7.0	---	.0	.0	.0		11.0	---	18.5	---	20.0	18.0
17	---	---	.0	.0	.0		---	12.0	18.0	---	21.0	17.0
18	---	---	.0	.0	.0		16.0	---	21.0	---	20.0	---
19	2.0	---	---	---	1.0		---	---	19.0	19.0	20.0	15.0
20	---	---	---	---	3.0		7.0	---	---	21.0	21.0	---
21	7.0	---	.0	.0	---		12.0	---	17.0	20.0	22.0	---
22	5.0	---	---	.0	---		---	---	---	20.0	21.0	20.0
23	2.0	---	.0	---	---		---	---	---	20.0	19.0	17.0
24	5.0	---	---	.0	---		7.0	---	---	20.5	20.0	18.0
25	---	---	---	---	---		---	---	20.0	24.0	20.0	16.0
26	---	---	.0	.0	---		10.0	---	---	20.0	21.0	18.0
27	2.0	---	.0	---	---		10.0	---	---	21.0	20.0	---
28	1.0	---	---	.0	---		11.0	---	21.0	19.0	20.0	16.0
29	---	---	---	.0	---		---	---	---	20.0	---	---
30	1.0	---	---	.0	---		10.0	---	20.0	20.0	---	---
31	---	---	---	---	---		---	---	---	19.0	22.0	---

04159130 ST. CLAIR RIVER AT PORT HURON, MI

(National stream-quality accounting network station)

LOCATION.--Lat 42°59'19", long 82°25'29", in SE¼ sec.3, T.6 N., R. 17 E., St. Clair County, Hydrologic Unit 04090001, at Port Huron municipal water treatment plant at Pine Grove Park at Port Huron.

DRAINAGE AREA.--222,400 mi² (576,000 km²), approximately.

PERIOD OF RECORD.--Water year 1970-73, January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981 (discontinued).
WATER TEMPERATURES: April 1978 to September 1981 (discontinued).

REMARKS.--Daily specific conductance and water-temperature records are once-daily measurements made by a local observer, between 0600 and 2100 hours. Samples are collected from a stilling well located in the Port Huron municipal water treatment plant. Depth-integrated samples for October, May, and September were collected from a boat along river cross section in the vicinity of the water treatment plant.

COOPERATION.--Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 260 micromhos Dec. 18, 1981; minimum daily, 194 micromhos Jan. 27, 28, 1980.
WATER TEMPERATURES: Maximum daily, 24.0°C Aug. 14-16, 1980; minimum daily, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance value of 164 micromhos was observed July 3, 1972.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 260 micromhos Dec. 18; minimum daily, 203 micromhos on many days.
WATER TEMPERATURES: Maximum daily, 22.0°C on many days during July and August; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
08...	1100	215000	206	8.2	14.0	9.8	97	K3	<1	91	21	25
NOV												
18...	1600	213000	206	8.0	5.0	11.8	--	K2	K8	90	17	25
JAN												
23...	0930	174000	230	7.7	.5	14.0	100	<1	<1	98	23	27
MAR												
26...	0930	196000	222	7.7	2.0	14.2	104	K1	<1	91	9	26
MAY												
20...	1200	208000	218	8.1	10.0	11.3	101	K1	<1	100	10	28
JUL												
16...	1115	210000	208	8.1	21.5	7.5	86	K2	K7	100	18	29
SEP												
23...	1115	211000	212	8.3	15.5	9.4	94	E13	K6	110	33	29

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
08...	6.9	3.4	7	.2	.8	.60	98	0	80	.9	16
NOV											
18...	6.8	3.3	7	.2	.9	.70	100	0	82	1.4	17
JAN											
23...	7.3	3.3	7	.1	.8	.60	100	0	82	2.9	17
MAR											
26...	6.4	3.5	8	.2	1.0	.70	100	0	82	3.2	17
MAY											
20...	7.3	4.2	8	.2	.9	.70	110	0	90	1.2	17
JUL											
16...	7.8	4.3	8	.2	.9	.70	100	0	82	1.3	17
SEP											
23...	8.1	3.4	6	.1	.8	--	120	0	77	.8	16

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT 08...	5.7	.1	1.2	112	103	65000	.32	.30	--	.020	.03
NOV 18...	6.2	.1	1.0	114	105	65600	.28	.28	--	--	--
JAN 23...	6.1	.1	1.2	123	109	57800	.37	.35	<.010	<.010	.01
MAR 26...	6.3	.1	1.3	124	112	65600	.35	.35	.040	.020	.03
MAY 20...	6.5	<.1	.6	127	111	71300	.41	.41	.020	.030	.04
JUL 16...	6.3	<.1	.7	130	117	73700	.28	.26	.010	<.010	.01
SEP 23...	6.3	<.1	1.4	126	113	71800	--	.29	--	.020	.03

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 08...	--	.21	.53	2.3	.020	.06	.010	1.7	2	1160	100
NOV 18...	.29	.29	.57	2.5	.010	.03	.010	2.3	--	--	--
JAN 23...	--	.20	.57	2.5	.010	.03	<.010	1.4	--	--	--
MAR 26...	.21	.25	.60	2.7	.020	.06	.010	2.1	--	--	--
MAY 20...	.22	.24	.65	2.9	<.010	.03	.010	1.8	5	2810	100
JUL 16...	.69	.70	.98	4.3	<.010	.03	<.010	1.8	--	--	--
SEP 23...	--	--	--	--	--	--	<.010	--	29	16500	100

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 08...	1100	1	1	100	30	2	2	10	<10	0	0
JAN 23...	0930	1	0	<50	20	<1	<1	20	10	0	0
MAR 26...	0930	0	0	100	0	0	0	20	<10	0	0
JUL 16...	1115	1	1	100	20	1	--	10	10	3	2
SEP 23...	1115	3	3	100	100	3	<1	10	10	6	3

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 08...	8	3	60	0	3	1	10	0	.2	.2
JAN 23...	4	2	330	<10	3	2	10	<1	.1	<.1
MAR 26...	2	2	170	20	1	1	10	10	<.1	<.1
JUL 16...	4	2	170	<10	6	1	<1	<1	.2	<.1
SEP 23...	11	1	530	<10	2	1	10	10	12	.3

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 08...	2	2	0	0	0	0	10	10	1.4	.3
JAN 23...	4	0	0	0	0	0	30	<4	1.4	.0
MAR 26...	6	1	0	0	0	0	50	10	1.9	.2
JUL 16...	10	2	0	0	0	0	20	<4	1.6	.2
SEP 23...	3	2	<1	<1	<1	<1	10	<10	2.7	--

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 18,80	MAR 26,81	MAY 20,81	JUL 16,81	SEP 23,81
TIME	1600	0930	1200	1115	1115
TOTAL CELLS/ML	1100	170	4700	410	5700
DIVERSITY: DIVISION	0.4	1.0	1.3	0.8	1.4
.CLASS	0.4	1.0	1.3	0.8	1.4
..ORDER	0.9	1.4	2.1	0.9	1.6
...FAMILY	1.3	1.4	2.4	0.9	1.9
....GENUS	1.8	1.4	2.6	0.9	2.3

ORGANISM	NOV 18,80 CELLS /ML	PER-CENT	MAR 26,81 CELLS /ML	PER-CENT	MAY 20,81 CELLS /ML	PER-CENT	JUL 16,81 CELLS /ML	PER-CENT	SEP 23,81 CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	13	8	--	-	--	-	--	-
...COCCOMYXACEAE										
....ELAKATOTHRIX	39	3	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	--	-	--	-	28	1	--	-	2200#	38
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	130	3	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	--	-	*	0
....OOCYSTIS	13	1	--	-	--	-	--	-	41	1
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	110	2	51	13	190	3
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	42	1	13	3	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	*	0
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	90	8	120#	69	70	2	330#	81	96	2
....MELOSIRA	64	6	--	-	240	5	--	-	--	-
..PENNALES										
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	*	0
....CYMBELLA	--	-	--	-	--	-	--	-	*	0
...FRAGILARIACEAE										
....ASTERIONELLA	100	9	--	-	--	-	--	-	--	-
....FRAGILARIA	730#	66	--	-	390	8	--	-	330	6
....SYNEDRA	--	-	--	-	84	2	--	-	--	-
...NAVICULACEAE										
....NAVICULA	13	1	--	-	--	-	--	-	41	1
...NITZSCHIACEAE										
....NITZSCHIA	39	3	13	8	*	0	--	-	41	1
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	*	0
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	970#	21	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	430	7
....ANACYSTIS	13	1	--	-	56	1	13	3	2000#	36
....EUCAPSIS	--	-	--	-	--	-	--	-	110	2
....GOMPHOSPHAERIA	--	-	--	-	560	12	--	-	--	-
..NOSTOCALES										
...HAMMATOIDEACEAE										
....RAPHIDIOPSIS	--	-	--	-	42	1	--	-	--	-
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	110	2
....OSCILLATORIA	--	-	--	-	1900#	41	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..DINOKONTAE										
...GLENODINIACEAE										
....GLENODINIUM	--	-	26#	15	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	208	208	210	205	214	203	206	210	208	209	208	207
2	208	208	206	211	213	204	206	213	210	209	209	---
3	209	207	210	222	---	204	204	213	213	209	206	207
4	209	205	209	215	213	206	204	213	211	209	208	207
5	---	205	209	212	213	204	204	210	211	209	207	207
6	211	206	207	212	210	206	209	213	210	209	207	207
7	209	206	207	210	210	210	206	217	208	209	207	207
8	209	206	207	210	210	210	207	215	206	209	207	204
9	210	204	207	210	210	210	206	213	204	209	207	206
10	209	207	207	210	210	213	203	210	204	209	207	207
11	208	208	214	214	210	207	203	220	204	210	207	207
12	209	210	208	216	204	212	203	224	205	210	207	203
13	212	210	208	217	212	210	203	219	208	208	207	204
14	210	208	211	216	208	218	203	216	209	210	207	204
15	209	208	211	216	208	216	203	218	209	223	207	207
16	208	---	211	213	206	229	208	223	208	210	210	210
17	215	208	227	213	206	225	207	223	---	205	206	208
18	208	208	260	212	206	227	206	224	207	208	207	---
19	208	209	220	210	206	219	206	219	207	206	210	---
20	208	209	214	211	206	219	213	219	207	206	210	---
21	208	209	214	211	207	222	209	212	208	206	210	---
22	209	---	227	211	203	218	206	209	207	209	210	---
23	209	---	208	212	207	215	205	213	208	207	210	---
24	208	209	208	216	205	217	207	212	209	212	210	---
25	206	211	222	215	205	220	210	213	207	207	210	---
26	208	211	218	217	206	220	210	213	207	213	210	---
27	208	216	216	212	209	220	209	---	207	213	210	---
28	206	210	209	212	203	215	209	210	207	208	208	---
29	208	210	209	214	---	209	209	209	208	222	208	---
30	208	210	229	214	---	206	211	206	208	---	210	---
31	208	---	226	214	---	206	---	207	---	208	207	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17.0	9.0	5.5	.5	.5	2.0	2.0	8.0	11.0	16.0	21.0	21.0
2	17.0	8.5	5.5	.5	.5	2.0	2.0	8.0	11.0	17.5	21.0	21.0
3	17.0	8.5	4.0	.5	.5	2.0	3.5	8.5	11.0	18.0	21.5	20.5
4	16.0	8.5	4.0	.0	.5	2.0	4.0	8.0	11.0	18.0	21.5	20.5
5	16.0	8.5	4.0	.5	.5	2.0	5.0	8.0	12.0	18.0	21.5	20.5
6	16.0	8.5	4.0	.5	.5	2.0	4.0	8.0	12.0	18.0	22.0	20.5
7	16.0	8.5	4.0	.5	.5	2.0	4.0	8.0	12.0	19.0	22.0	19.5
8	16.0	8.5	4.0	.5	.0	2.0	3.5	8.0	12.0	20.0	22.0	19.5
9	16.0	8.5	4.0	.5	.0	2.0	3.5	8.0	13.0	20.0	22.0	19.5
10	15.0	8.5	4.0	.5	.0	2.0	3.5	8.5	14.0	21.0	22.0	19.5
11	14.5	8.5	4.0	.5	.0	2.0	4.0	8.0	14.5	21.5	22.0	19.5
12	14.0	8.5	4.0	.5	.0	2.0	4.0	7.0	15.0	21.5	22.0	20.0
13	14.0	9.0	4.0	.5	.0	2.0	4.0	7.0	15.0	21.0	22.0	20.0
14	13.0	7.0	3.0	1.0	.0	2.0	4.0	7.0	15.0	21.0	22.0	20.0
15	13.0	7.0	3.0	1.0	.5	2.0	4.0	8.5	15.5	21.5	22.0	20.0
16	13.0	---	3.0	1.0	.5	2.0	4.0	8.5	16.0	22.0	22.0	20.0
17	13.0	7.0	3.0	1.0	.5	2.0	5.5	8.5	15.5	22.0	21.0	20.0
18	13.0	7.5	3.0	1.0	.5	2.0	5.5	8.5	15.5	22.0	21.0	20.0
19	13.0	7.0	3.0	1.0	.5	2.0	5.5	8.5	15.5	22.0	21.0	---
20	13.0	6.5	.5	1.0	.5	2.0	5.5	8.5	15.5	22.0	21.0	---
21	13.0	6.5	.5	1.0	.5	1.0	3.5	9.0	16.0	22.0	21.0	---
22	13.0	---	.5	1.0	1.5	1.0	3.5	10.0	15.5	21.5	21.0	---
23	13.0	---	.5	1.0	1.5	1.0	3.5	10.0	16.0	21.0	21.0	---
24	13.0	6.5	1.0	.5	1.5	1.0	3.5	10.5	16.0	21.0	21.0	---
25	11.0	6.5	1.0	.5	1.5	1.0	6.5	11.0	16.0	21.0	21.0	---
26	10.5	6.5	1.0	.5	1.5	1.0	6.5	11.5	16.0	22.0	21.0	---
27	10.5	5.5	.5	.5	1.5	1.0	6.5	11.0	16.5	22.0	21.0	---
28	10.5	6.0	.5	.5	1.5	2.0	6.5	12.0	16.5	22.0	21.0	---
29	9.0	5.5	1.0	.5	---	2.0	6.0	11.0	16.5	21.0	21.0	---
30	9.0	5.5	1.0	.5	---	2.0	6.0	11.0	16.5	21.0	21.0	---
31	9.0	---	1.0	.5	---	2.0	---	11.0	---	21.0	21.0	---

04159488 SILVER CREEK NEAR JEDDO, MI

LOCATION.--Lat 43°08'40", long 82°39'07", in SE¼ NW¼ sec.12, T.8 N., R.15 E., St. Clair County, Hydrologic Unit 04090001, on left bank 10 ft (3 m) downstream of bridge on Comstock Road, 3.5 mi (5.6 km) west of Jeddo.

DRAINAGE AREA.--20.6 mi² (53.4 km²).

PERIOD OF RECORD.--January 1978 to current year.

GAGE.--Water-stage recorder. Datum of gage is 707.43 ft (215.625 m) National Geodetic Vertical Datum of 1929 (levels by local surveying firm).

REMARKS.--Records fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 650 ft³/s (18.4 m³/s) Feb. 18, 1981, gage height, 10.43 ft (3.179 m), backwater from ice; minimum discharge, 0.05 ft³/s (0.001 m³/s) Aug. 23, 24, 25, 1981; minimum gage height, 3.62 ft (1.103 m) Aug. 17, 18, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 18	--	*650	18.4	*a10.43	3.179	May 11	1800	403	11.4	7.45	2.271
Feb. 23	0600	486	13.8	7.78	2.371	Sept. 5	0200	352	9.97	7.26	2.213
Apr. 14	0800	313	8.86	6.99	2.131						

a Ice jam.
Minimum discharge, 0.05 ft³/s (0.001 m³/s) Aug. 23, 24, 25, gage height, 3.66 ft (1.116 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.98	.45	.94	.89	1.3	47	10	11	2.0	1.8	1.2	5.7
2	1.3	.46	3.1	.89	1.4	22	7.0	7.0	1.6	2.5	1.1	6.2
3	1.8	.60	4.0	.89	1.4	13	5.6	4.9	1.6	1.9	1.2	9.2
4	3.0	1.4	5.5	.89	1.4	7.5	7.2	3.7	1.5	1.5	1.8	195
5	4.1	5.9	6.5	.89	1.3	6.2	8.4	2.2	1.8	.99	1.9	263
6	2.5	6.7	7.2	.89	1.3	5.0	6.5	1.8	1.7	1.0	1.9	60
7	1.6	2.4	33	.89	1.2	6.8	6.0	1.9	1.1	1.1	2.3	21
8	1.5	.61	80	.89	1.1	4.0	4.7	2.6	1.2	.53	5.0	10
9	1.1	.59	74	.89	1.1	5.3	5.2	2.4	1.1	1.8	4.3	5.8
10	.87	2.6	22	.89	1.1	6.5	5.5	12	.80	1.8	1.8	3.6
11	.77	4.3	18	.88	2.0	6.9	15	313	.99	1.8	1.3	2.4
12	.62	3.8	5.8	.88	1.7	5.4	18	115	.84	1.9	1.7	1.9
13	.51	3.5	3.8	.86	1.6	5.3	13	29	.74	1.8	1.6	1.4
14	.70	2.6	3.0	.88	1.5	4.7	214	13	1.4	1.8	1.2	2.1
15	2.6	.74	1.7	.88	1.5	3.0	41	26	1.6	2.0	3.1	3.0
16	3.7	.76	1.4	.88	10	2.7	16	37	1.3	1.9	2.2	.70
17	3.8	.70	1.2	.88	100	2.3	13	13	2.9	2.1	1.7	4.8
18	3.4	1.2	1.0	.88	600	2.1	19	6.3	2.2	2.7	.74	6.9
19	2.6	5.5	.95	.88	460	1.9	13	4.1	1.3	2.0	.47	5.6
20	1.9	5.0	.90	.88	270	1.6	8.2	4.8	.91	2.2	.28	3.2
21	1.8	4.4	.90	.90	107	2.2	7.9	2.7	1.9	3.5	.20	1.8
22	2.2	4.6	.90	.92	70	2.3	7.3	2.3	4.9	4.3	.08	44
23	6.0	2.8	.90	.95	390	2.0	35	2.6	5.8	2.0	.07	33
24	9.8	2.1	.90	.96	115	1.9	25	2.8	3.9	1.2	.09	10
25	4.0	2.9	.90	1.0	46	2.0	14	2.9	3.0	1.1	.09	4.9
26	1.0	4.7	.89	1.0	29	3.9	6.6	2.8	1.5	1.5	.26	3.3
27	.94	4.1	.89	1.1	17	11	4.6	2.3	1.2	1.6	.27	6.4
28	1.2	1.2	.89	1.1	82	8.9	124	3.7	1.6	2.2	.59	9.7
29	.77	.90	.89	1.2	---	8.1	84	4.3	1.4	2.3	.83	4.7
30	.61	.95	.89	1.2	---	10	25	3.4	1.6	2.0	.93	5.4
31	.51	---	.89	1.3	---	13	---	2.9	---	2.3	.44	---
TOTAL	68.18	78.46	283.83	29.33	2316.9	224.5	769.7	645.4	55.38	59.12	40.64	734.70
MEAN	2.20	2.62	9.16	.95	82.7	7.24	25.7	20.8	1.85	1.91	1.31	24.5
MAX	9.8	6.7	80	1.3	600	47	214	313	5.8	4.3	5.0	263
MIN	.51	.45	.89	.88	1.1	1.6	4.6	1.8	.74	.53	.07	.70
CFSM	.11	.13	.45	.05	4.02	.35	1.25	1.01	.09	.09	.06	1.19
IN.	.12	.14	.51	.05	4.18	.41	1.39	1.17	.10	.11	.07	1.33

CAL YR 1980 TOTAL 5034.85 MEAN 13.8 MAX 417 MIN .42 CFSM .67 IN 9.09
WTR YR 1981 TOTAL 5306.14 MEAN 14.5 MAX 600 MIN .07 CFSM .70 IN 9.58

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW¼ sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft (6 m) downstream from bridge on Norman Road, 2.1 mi (3.4 km) east of Fargo, 5.3 mi (8.5 km) upstream from Mill Creek, and 12 mi (19 km) northwest of Port Huron.

DRAINAGE AREA.--480 mi^2 (1,243 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1944 to current year.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft (187.071 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--37 years, 278 ft^3/s (7.873 m^3/s), 7.87 in/yr (200 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft^3/s (408 m^3/s) Apr. 5, 1947, gage height, 16.06 ft (4.895 m), from floodmark, from rating curve extended above 9,500 ft^3/s (269 m^3/s); maximum gage height observed, 18.05 ft (5.502 m) Feb. 20, 1951, backwater from ice; minimum discharge observed, 1.8 ft^3/s (0.051 m^3/s) Sept. 18, 19, 1946.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft^3/s (99.1 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 19	1000	*5990	170	*12.39	3.776	Sept. 6	0300	4820	137	11.22	3.420
May 12	1700	3710	105	9.91	3.021						

Minimum discharge, 21 ft^3/s (0.59 m^3/s) July 28; minimum gage height, 1.92 ft (0.585 m) July 15, 17, 18, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	76	47	47	39	36	1830	234	1010	91	40	45	205
2	70	44	52	39	35	1480	206	507	85	39	35	724
3	65	42	54	38	34	771	171	350	78	38	29	1530
4	70	43	62	38	33	472	154	268	73	38	25	2210
5	106	44	66	38	33	383	163	221	72	39	26	4220
6	130	49	68	38	33	322	159	192	71	62	24	4750
7	110	51	91	37	33	274	139	171	70	68	25	4580
8	91	46	296	37	33	235	123	153	66	56	44	4120
9	78	44	789	37	34	224	122	137	64	45	455	3190
10	70	43	848	37	37	227	176	137	63	38	687	1850
11	63	45	505	36	60	255	262	998	62	34	357	641
12	57	43	256	36	80	253	372	3380	61	32	168	358
13	52	42	215	36	65	238	418	3320	59	29	100	272
14	52	43	200	36	65	236	1180	2280	57	27	76	214
15	55	42	160	36	70	194	1990	868	57	24	69	190
16	64	40	130	36	90	191	1520	680	55	24	74	165
17	92	39	110	36	320	178	670	590	55	23	92	373
18	114	39	90	36	2400	159	457	402	54	24	77	1670
19	125	40	80	36	5800	143	364	306	52	26	63	1670
20	121	42	70	36	5540	129	277	252	50	26	51	963
21	101	42	60	36	5000	125	231	213	49	28	40	516
22	86	42	50	36	4370	121	197	182	96	28	34	1060
23	79	42	45	36	4150	116	234	160	130	27	32	1740
24	78	41	42	36	4290	115	337	143	117	25	29	1090
25	69	41	40	36	3470	117	350	134	83	23	25	507
26	62	40	40	37	2230	122	290	138	66	23	23	361
27	58	40	40	38	1150	144	231	132	58	23	23	534
28	54	40	40	39	1060	173	303	120	52	27	25	1630
29	54	39	39	39	---	182	1070	111	47	33	41	1150
30	51	45	39	38	---	186	1710	105	42	62	160	524
31	49	---	39	37	---	225	---	98	---	58	172	---
TOTAL	2402	1280	4663	1146	40551	9820	14110	17758	2035	1089	3126	43007
MEAN	77.5	42.7	150	37.0	1448	317	470	573	67.8	35.1	101	1434
MAX	130	51	848	39	5800	1830	1990	3380	130	68	687	4750
MIN	49	39	39	36	33	115	122	98	42	23	23	165
CFSM	.16	.09	.31	.08	3.02	.66	.98	1.19	.14	.07	.21	2.99
IN.	.19	.10	.36	.09	3.14	.76	1.09	1.38	.16	.08	.24	3.33

CAL YR 1980 TOTAL 84911 MEAN 232 MAX 4310 MIN 26 CFSM .48 IN 6.58
WTR YR 1981 TOTAL 140987 MEAN 386 MAX 5800 MIN 23 CFSM .80 IN 10.93

04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1978 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 4, 1978.

REMARKS.--Missing record was due to vandalism.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum 29.5°C July 13, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 29.5°C July 13; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	5.5	5.0	2.0	1.5	.0	.0	.0	.0	1.5	1.5
2	---	---	5.5	5.0	2.5	1.0	.0	.0	.0	.0	1.5	1.5
3	---	---	---	---	1.0	.0	.0	.0	.0	.0	1.5	.5
4	---	---	---	---	.0	.0	.0	.0	.0	.0	1.5	.5
5	---	---	---	---	.0	.0	.0	.0	.0	.0	1.0	.5
6	---	---	---	---	.0	.0	.0	.0	.0	.0	1.5	.5
7	---	---	---	---	2.0	.0	.0	.0	.0	.0	1.5	.5
8	---	---	---	---	3.0	2.0	.0	.0	.0	.0	3.0	1.0
9	---	---	---	---	3.0	2.5	.0	.0	.0	.0	3.5	2.5
10	---	---	---	---	2.5	1.0	.0	.0	.0	.0	3.5	3.0
11	---	---	6.0	4.5	1.0	.0	.0	.0	.0	.0	3.0	2.5
12	---	---	3.5	2.5	.0	.0	.0	.0	.0	.0	4.0	2.0
13	---	---	3.0	2.5	.0	.0	.0	.0	.0	.0	4.0	2.5
14	---	---	3.5	3.0	.0	.0	.0	.0	.0	.0	3.5	2.0
15	---	---	3.5	3.5	.0	.0	.0	.0	.0	.0	4.5	3.0
16	---	---	3.5	3.0	.0	.0	.0	.0	.0	.0	4.5	3.5
17	---	---	3.0	3.0	.0	.0	.0	.0	.0	.0	4.0	2.5
18	---	---	3.0	3.0	.0	.0	.0	.0	.0	.0	3.0	2.0
19	---	---	3.0	1.5	.0	.0	.0	.0	.0	.0	2.5	2.0
20	---	---	1.5	1.5	.0	.0	.0	.0	.0	.0	2.0	1.5
21	9.5	9.0	1.5	1.0	.0	.0	.0	.0	.5	.5	3.5	2.5
22	9.0	8.0	1.5	1.0	.0	.0	.0	.0	1.0	.5	4.5	2.0
23	8.5	7.0	1.5	1.0	.0	.0	.0	.0	2.0	1.0	5.5	3.0
24	9.0	7.0	2.5	1.5	.0	.0	.0	.0	2.0	2.0	6.5	4.5
25	9.0	8.5	2.5	1.0	.0	.0	.0	.0	2.0	1.5	7.0	4.5
26	8.5	7.0	1.5	.5	.0	.0	.0	.0	2.0	1.5	6.5	5.0
27	7.0	6.0	.5	.5	.0	.0	.0	.0	1.5	1.5	8.0	5.5
28	6.5	5.5	1.0	.5	.0	.0	.0	.0	1.5	1.5	8.5	6.0
29	5.5	4.5	1.5	1.0	.0	.0	.0	.0	---	---	10.0	8.0
30	5.0	4.0	2.0	1.0	.0	.0	.0	.0	---	---	11.0	10.0
31	6.0	5.5	---	---	.0	.0	.0	.0	---	---	12.0	10.0
MONTH					3.0	.0	.0	.0	2.0	.0	12.0	.5

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	12.5	11.5	12.5	10.5	19.5	15.5	22.5	21.5	25.0	21.5	23.0	21.5
2	12.5	10.5	13.5	11.0	20.5	17.0	24.5	21.0	25.5	22.5	22.5	21.0
3	13.0	10.5	14.5	11.5	21.5	19.5	25.5	22.0	25.5	23.5	21.0	20.0
4	13.0	12.0	15.5	12.5	22.0	20.0	25.5	23.0	26.5	23.0	20.0	19.5
5	13.0	9.5	15.0	13.5	23.5	20.0	26.5	23.0	26.5	23.0	19.5	19.5
6	11.5	8.5	14.5	12.5	25.0	22.0	27.0	23.5	25.5	22.0	19.5	19.0
7	12.0	9.0	15.0	11.5	23.0	21.0	28.0	24.5	25.0	22.0	19.0	18.5
8	12.5	10.0	16.0	12.0	22.0	20.5	28.5	26.0	24.0	22.0	19.0	19.0
9	14.5	12.0	15.5	14.0	22.5	20.5	28.5	26.5	23.0	21.5	18.5	18.5
10	14.0	11.5	15.0	11.0	22.5	20.5	28.0	23.5	21.0	20.0	19.5	17.5
11	13.5	13.0	11.0	8.0	22.5	20.0	27.5	23.5	22.0	20.5	21.0	18.0
12	13.5	11.5	8.0	7.5	22.0	21.0	28.0	24.5	22.5	20.5	21.0	19.0
13	11.5	10.5	9.5	7.5	21.5	20.0	29.5	25.5	24.0	21.0	21.0	19.0
14	11.0	10.5	10.5	9.0	21.0	19.5	28.0	24.5	24.0	22.5	20.0	20.5
15	10.5	9.0	10.5	10.5	26.0	21.0	25.5	22.5	23.5	22.0	19.5	18.5
16	10.0	8.5	13.0	10.0	25.5	22.0	27.0	22.5	22.5	21.0	17.5	17.5
17	12.5	10.0	13.0	11.5	23.5	20.5	27.0	22.5	22.0	19.0	15.5	15.5
18	13.5	12.0	14.0	11.5	24.5	20.5	27.0	23.0	21.5	18.5	15.0	14.0
19	12.5	11.5	15.0	12.5	23.5	21.0	26.5	24.0	21.5	19.0	14.0	14.5
20	12.0	10.5	16.0	13.0	23.0	19.5	25.5	24.5	22.5	19.5	13.0	14.5
21	11.5	9.0	18.0	14.5	23.5	20.5	24.5	22.0	23.0	20.0	13.5	14.0
22	11.5	10.0	19.5	16.0	22.0	20.5	24.0	20.0	23.5	20.0	13.5	13.0
23	12.5	10.5	21.0	17.5	22.0	19.0	24.5	19.5	24.5	20.5	15.0	12.5
24	11.5	10.0	20.5	19.0	22.5	20.0	25.5	21.0	24.5	21.5	16.0	12.5
25	10.0	9.0	21.5	18.5	23.5	21.5	26.5	21.5	24.0	20.5	13.5	13.5
26	10.0	8.0	23.0	20.0	22.5	20.0	25.0	23.0	23.5	20.0	15.0	13.5
27	12.0	9.0	22.5	18.0	22.5	19.0	24.5	21.0	22.5	21.0	16.0	15.0
28	11.5	11.0	18.0	17.0	23.5	20.0	22.5	20.0	22.5	20.5	16.0	15.5
29	11.0	10.5	20.5	16.5	26.5	21.5	22.5	19.0	22.5	21.5	15.5	14.0
30	11.0	9.5	20.5	18.5	25.5	22.5	23.0	19.5	22.5	21.0	14.0	13.0
31	---	---	19.0	16.0	---	---	23.5	20.5	22.5	21.5	---	---
MONTH	14.5	8.0	23.0	7.5	26.5	15.5	29.5	19.0	26.5	18.5	23.0	12.5

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW¼ NW¼ sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft (4 m) upstream from bridge on State Highway 21, and 0.6 mi (1.0 km) northeast of Imlay City.

DRAINAGE AREA.--18.0 mi² (46.6 km²).

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 800 ft (244 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 11.3 ft³/s (0.320 m³/s), 8.53 in/yr (217 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 334 ft³/s (9.46 m³/s) Apr. 19, 1975, gage height, 9.33 ft (2.844 m); no flow for part of each day June 27, 28, 1977, June 26-28, 1979, caused by irrigation pumpage.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft³/s (1.70 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 19	0400	*172	4.87	*7.17	2.185
Feb. 23	0800	123	3.48	6.15	1.875
Feb. 28	1100	60	1.70	4.77	1.454
Apr. 14	1100	85	2.41	5.32	1.622
Apr. 28	1800	69	1.95	4.96	1.512
May 11	1200	144	4.08	6.54	1.993
Sept. 4	2000	94	2.66	4.50	1.372

Minimum daily discharge, 1.0 ft³/s (0.028 m³/s) Aug. 23-25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.4	4.0	6.3	4.2	5.8	45	15	23	6.7	4.5	2.7	12
2	4.9	4.0	13	4.2	6.0	36	13	17	6.3	4.5	2.4	8.7
3	6.0	4.2	18	4.2	6.6	28	12	14	6.5	4.1	2.3	8.1
4	6.2	4.2	11	4.2	7.0	23	15	12	7.2	4.6	2.3	63
5	5.2	4.1	8.4	4.1	7.0	21	14	11	5.9	4.8	2.0	63
6	15	3.8	8.6	4.1	7.0	18	11	10	5.4	4.0	1.8	43
7	7.0	3.9	37	4.1	7.0	18	9.9	9.4	5.0	3.6	2.3	31
8	6.0	4.8	49	4.1	7.0	14	9.2	8.8	5.0	3.3	3.3	23
9	4.4	4.6	47	4.1	7.0	15	12	8.6	4.8	3.1	3.1	16
10	4.0	4.1	30	4.1	8.0	16	11	21	4.7	2.8	2.4	11
11	4.2	3.8	23	4.0	11	16	21	119	4.6	2.6	2.1	7.9
12	3.6	3.6	15	4.0	15	15	19	98	4.5	2.5	2.1	6.3
13	3.4	4.1	13	4.0	12	15	17	57	4.2	2.4	1.8	5.5
14	3.8	4.7	12	4.0	10	15	65	39	19	2.1	1.8	5.1
15	9.0	4.4	7.6	4.0	12	12	37	34	25	2.0	3.3	4.7
16	9.8	3.9	6.6	4.0	22	12	25	30	16	2.1	3.1	5.0
17	8.7	4.0	6.3	4.0	66	11	20	22	12	2.2	3.3	13
18	8.4	4.9	5.8	4.0	137	10	18	17	9.4	2.5	1.5	12
19	7.3	4.1	6.1	4.0	170	9.6	14	15	7.9	2.3	2.2	8.6
20	6.2	4.2	5.5	4.0	144	9.1	13	12	6.5	3.0	1.7	6.7
21	7.3	4.4	5.0	4.0	98	9.1	11	10	5.9	3.4	1.2	7.3
22	6.4	4.3	4.8	4.0	72	9.0	10	9.8	10	2.7	1.1	23
23	5.4	4.2	4.6	4.0	114	9.1	27	8.7	8.9	2.4	1.0	17
24	5.0	4.4	4.5	4.5	89	9.6	22	9.1	7.5	2.2	1.0	12
25	6.4	4.4	4.4	4.7	66	9.9	17	10	6.6	2.0	1.0	9.0
26	5.8	4.0	4.3	5.0	50	12	14	9.4	5.6	4.7	1.1	8.9
27	4.8	4.1	4.3	5.5	39	16	13	8.9	4.9	4.0	1.4	14
28	4.5	5.1	4.3	5.8	55	14	49	9.2	4.3	8.9	4.3	12
29	4.3	5.6	4.2	6.0	---	14	46	8.5	4.1	7.0	12	8.2
30	4.4	5.8	4.2	6.0	---	16	30	7.8	3.8	4.2	10	9.2
31	4.4	---	4.2	5.8	---	18	---	7.3	---	3.2	6.8	---
TOTAL	185.2	129.7	378.0	136.7	1253.4	495.4	610.1	676.5	228.2	107.7	88.4	474.2
MEAN	5.97	4.32	12.2	4.41	44.8	16.0	20.3	21.8	7.61	3.47	2.85	15.8
MAX	15	5.8	49	6.0	170	45	65	119	25	8.9	12	63
MIN	3.4	3.6	4.2	4.0	5.8	9.0	9.2	7.3	3.8	2.0	1.0	4.7
CFSM	.33	.24	.68	.25	2.49	.89	1.13	1.21	.42	.19	.16	.88
IN.	.38	.27	.78	.28	2.59	1.02	1.26	1.40	.47	.22	.18	.98

CAL YR 1980 TOTAL 4021.07 MEAN 11.0 MAX 117 MIN .80 CFSM .61 IN 8.31
WTR YR 1981 TOTAL 4763.50 MEAN 13.1 MAX 170 MIN 1.0 CFSM .73 IN 9.84

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW¼ SE¼ sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right bank, at downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi^2 (391 km^2).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 84.3 ft^3/s (2.387 m^3/s), 7.58 in/yr (193 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft^3/s (128 m^3/s) Apr. 19, 1975, gage height, 8.96 ft (2.731 m); minimum, 2.3 ft^3/s (0.065 m^3/s) Sept. 6, 10, 1978; minimum gage height, 1.17 ft (0.357 m) Sept. 6, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft (2.7 m), from information by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft^3/s (17.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 19	0900	*1570	44.5	*7.04	2.146	May 12	0900	936	27.1	5.80	1.768
Feb. 23	2000	1270	36.0	6.50	1.981	Sept. 5	1400	749	21.2	4.93	1.503

Minimum discharge, 6.6 ft^3/s (0.19 m^3/s) Aug. 27, gage height, 1.32 ft (0.402 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	23	23	23	22	356	101	168	37	19	17	27
2	18	23	28	23	22	307	98	122	36	18	14	38
3	19	23	60	23	23	228	71	88	34	19	13	36
4	21	24	86	23	25	180	64	71	33	19	12	452
5	27	24	80	23	24	144	77	81	33	22	11	700
6	27	24	38	22	26	125	78	55	31	26	11	595
7	27	23	41	22	26	104	65	49	29	23	11	377
8	28	24	152	22	28	87	55	46	27	19	11	203
9	23	24	243	22	26	77	53	45	26	17	14	112
10	21	25	228	22	28	94	57	53	25	15	15	79
11	20	24	133	22	35	110	67	378	25	14	13	61
12	19	23	87	21	44	106	128	888	24	12	12	47
13	19	21	65	21	40	99	136	680	22	12	11	38
14	19	21	55	21	37	92	254	387	20	12	13	38
15	20	22	45	21	40	78	409	265	125	11	14	28
16	31	22	40	21	48	74	290	288	187	10	13	24
17	35	21	35	21	160	70	188	220	106	9.3	13	28
18	34	21	32	21	880	63	156	143	59	11	12	58
19	33	20	30	21	1520	57	129	106	45	11	12	76
20	31	21	28	21	1400	53	99	84	37	11	10	58
21	29	20	26	21	1300	51	61	70	38	12	9.1	47
22	27	19	25	21	1070	49	68	60	30	17	11	211
23	28	20	25	21	1150	48	109	54	38	11	9.7	299
24	26	20	24	21	1120	49	196	50	41	9.4	8.4	173
25	25	19	23	21	743	50	159	46	34	9.2	8.3	100
26	28	19	23	22	519	53	115	51	30	11	8.5	73
27	29	20	23	22	360	81	98	47	26	16	7.9	66
28	27	20	23	23	299	106	110	43	22	24	9.4	73
29	25	20	23	23	---	89	365	41	20	26	18	68
30	24	22	23	23	---	85	323	41	19	32	28	55
31	23	---	23	22	---	86	---	39	---	22	28	---
TOTAL	781	652	1790	676	11063	3251	4179	4759	1257	499.9	398.3	4228
MEAN	25.2	21.7	57.7	21.8	395	105	139	154	41.9	16.1	12.8	141
MAX	35	25	243	23	1520	356	409	888	187	32	28	700
MIN	18	19	23	21	22	48	53	39	19	9.2	7.9	24
CFSM	.17	.14	.38	.14	2.62	.70	.92	1.02	.28	.11	.08	.93
IN.	.19	.16	.44	.17	2.73	.80	1.03	1.17	.31	.12	.10	1.04

CAL YR 1980 TOTAL 26472.8 MEAN 72.3 MAX 1020 MIN 9.8 CFSM .48 IN 6.52
WTR YR 1981 TOTAL 33534.2 MEAN 91.9 MAX 1520 MIN 7.9 CFSM .61 IN 8.26

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE¼ sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank 25 ft (8 m) upstream from bridge on Maybee Road, 1.1 mi (1.8 km) upstream from mouth, and 2.5 mi (4.0 km) northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi² (54.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft (296 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for periods of plugged intakes, Feb. 19, 20, 22-26, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 12.1 ft³/s (0.343 m³/s), 7.86 in/yr (200 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 161 ft³/s (4.56 m³/s) Feb. 23, 1974, gage height, 4.38 ft (1.335 m); minimum, 0.2 ft³/s (0.006 m³/s) on many days during 1961, 1963, 1964, 1965, 1966; minimum gage height, 1.59 ft (0.485 m) Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 45 ft³/s (1.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 19	unknown	*74	2.10	unknown		Sept. 4	1700	56	1.59	3.42	1.042
Apr. 14	1600	48	1.36	3.26	0.994	Sept. 30	2400	a		*3.50	1.067

a Stage rising, peak occurred Oct. 1, 1981.

Minimum discharge, 0.65 ft³/s (0.018 m³/s) Aug. 25, 26, gage height, 1.80 ft (0.549 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.4	7.3	8.7	6.6	5.6	44	23	26	11	3.7	1.8	3.1
2	11	7.0	13	6.4	5.6	42	21	24	10	3.7	1.6	6.7
3	11	7.0	17	6.4	5.6	37	19	22	9.7	3.5	1.6	7.6
4	11	7.3	11	6.4	5.6	35	20	20	9.4	3.1	1.4	48
5	11	7.0	10	6.4	5.6	35	20	19	8.4	2.9	1.3	49
6	10	6.7	10	6.4	5.6	32	18	17	7.8	2.7	1.2	39
7	10	7.0	14	6.4	5.6	31	16	15	7.3	2.5	1.8	30
8	10	8.1	20	6.4	5.6	29	14	14	8.7	2.2	2.0	21
9	9.7	8.1	24	6.4	5.6	28	15	13	9.7	2.2	1.7	16
10	9.0	7.8	20	6.4	5.6	28	15	20	8.4	2.3	1.6	13
11	9.0	7.6	20	6.3	8.0	27	23	39	7.3	2.0	1.6	12
12	8.4	7.0	14	6.3	10	27	30	38	6.7	1.8	1.3	11
13	8.1	7.0	12	6.3	9.0	27	33	32	6.7	2.7	1.2	10
14	8.1	7.0	11	6.3	9.0	24	44	29	8.1	2.7	1.1	9.7
15	9.7	6.7	10	6.3	10	22	40	32	9.7	2.2	1.7	9.0
16	9.7	6.4	9.0	6.3	11	21	33	36	8.7	2.0	1.6	9.4
17	10	6.7	8.6	6.3	14	20	31	32	7.8	1.8	1.3	13
18	10	7.0	8.0	6.3	29	17	27	28	6.7	1.7	1.1	13
19	9.4	6.7	7.6	6.3	64	16	24	25	6.2	2.0	.99	12
20	9.0	6.7	7.4	6.3	69	15	22	23	5.2	1.8	.99	11
21	9.4	7.0	7.2	6.3	55	14	20	20	4.9	1.7	.90	12
22	9.4	6.4	7.2	6.2	48	13	19	18	9.4	1.7	.90	24
23	8.4	6.4	7.0	6.0	47	13	30	17	8.4	1.6	.90	19
24	8.1	6.7	7.0	6.0	48	13	28	15	7.0	1.4	.81	17
25	9.4	7.0	7.0	5.8	46	13	26	15	6.2	1.3	.73	15
26	9.0	6.4	7.0	5.8	44	16	23	14	5.4	1.4	.73	14
27	8.4	6.7	6.8	5.7	43	22	22	14	4.9	1.3	.73	14
28	8.1	7.3	6.8	5.7	45	20	24	14	4.5	3.1	2.0	13
29	7.8	7.6	6.8	5.6	---	19	27	13	3.7	3.7	3.3	12
30	7.6	8.1	6.6	5.6	---	22	27	13	3.7	2.7	4.5	19
31	7.3	---	6.6	5.6	---	25	---	12	---	2.2	3.7	---
TOTAL	286.4	211.7	331.3	191.5	665.0	747	734	669	221.6	71.6	48.08	502.5
MEAN	9.24	7.06	10.7	6.18	23.8	24.1	24.5	21.6	7.39	2.31	1.55	16.8
MAX	11	8.1	24	6.6	69	44	44	39	11	3.7	4.5	49
MIN	7.3	6.4	6.6	5.6	5.6	13	14	12	3.7	1.3	.73	3.1
CFSM	.44	.34	.51	.30	1.14	1.15	1.17	1.03	.35	.11	.07	.80
IN.	.51	.38	.59	.34	1.18	1.33	1.31	1.19	.39	.13	.09	.89

CAL YR 1980 TOTAL 4749.70 MEAN 13.0 MAX 69 MIN 4.0 CFSM .62 IN 8.45
WTR YR 1981 TOTAL 4679.08 MEAN 12.8 MAX 69 MIN .73 CFSM .61 IN 8.33

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE¼ sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank 14 ft (4 m) downstream from bridge on State Highway 59, 1.0 mi (1.6 km) downstream from State fish hatchery, and 2.0 mi (3.2 km) south of Drayton Plains.

DRAINAGE AREA.--79.2 mi² (205.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft (287 m) from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 49.8 ft³/s (1.410 m³/s), 8.54 in/yr (217 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft³/s (7.82 m³/s) Mar. 12, 1974, gage height, 4.95 ft (1.509 m); minimum, 2.4 ft³/s (0.068 m³/s) May 31, 1961; minimum gage height, 1.23 ft (0.375 m) Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 120 ft³/s (3.40 m³/s) Sept. 10, gage height, 3.55 ft (1.082 m); minimum, 7.3 ft³/s (0.21 m³/s) July 27, gage height, 1.98 ft (0.604 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	45	35	42	32	108	46	64	35	11	9.6	13
2	49	42	39	42	34	104	48	66	34	13	9.6	15
3	48	40	38	41	34	102	48	64	33	13	9.6	21
4	47	38	38	46	32	100	49	64	16	13	9.3	66
5	45	37	38	42	31	97	49	61	14	13	9.0	107
6	44	37	39	41	31	95	49	61	14	12	8.8	108
7	42	38	42	41	31	92	46	46	16	15	11	109
8	41	39	46	40	31	90	46	22	21	15	11	110
9	41	35	47	39	30	87	47	20	18	11	11	109
10	40	34	47	38	32	84	45	27	17	9.6	11	114
11	39	33	48	37	38	80	49	54	25	9.7	12	116
12	33	34	49	37	55	76	52	103	31	9.3	12	107
13	13	35	50	35	43	74	52	98	31	9.7	12	104
14	23	35	50	33	41	69	64	95	31	9.2	15	85
15	31	35	50	28	35	65	73	99	29	9.1	16	45
16	31	35	50	27	35	61	79	102	30	9.2	11	28
17	31	34	49	27	39	58	95	100	25	9.3	11	40
18	31	36	49	27	44	55	107	96	15	9.7	13	62
19	30	40	49	27	48	52	105	89	15	10	11	51
20	30	43	48	28	52	50	99	80	15	9.8	10	30
21	30	41	46	32	59	49	92	30	16	10	10	34
22	29	40	45	33	66	45	78	30	21	12	11	46
23	29	40	45	32	78	45	61	34	26	11	10	64
24	28	36	46	32	88	43	57	41	34	8.8	10	64
25	29	37	51	32	113	42	57	41	33	9.0	9.9	65
26	28	35	44	32	113	45	57	40	26	9.3	14	60
27	28	36	43	31	112	44	57	40	16	8.3	20	52
28	28	35	41	31	111	42	60	38	14	10	13	50
29	26	35	42	31	---	43	61	38	12	9.8	12	45
30	24	34	42	31	---	45	64	39	9.9	9.7	13	43
31	35	---	43	31	---	47	---	38	---	9.5	12	---
TOTAL	1049	1115	1389	1066	1488	2089	1892	1820	672.9	328.0	357.8	1963
MEAN	33.8	37.2	44.8	34.4	53.1	67.4	63.1	58.7	22.4	10.6	11.5	65.4
MAX	49	45	51	46	113	108	107	103	35	15	20	116
MIN	13	33	35	27	30	42	45	20	9.9	8.3	8.8	13
CFSM	.43	.47	.57	.43	.67	.85	.80	.74	.28	.13	.15	.83
IN.	.49	.52	.65	.50	.70	.98	.89	.85	.32	.15	.17	.92

CAL YR 1980 TOTAL 17217.0 MEAN 47.0 MAX 123 MIN 13 CFSM .59 IN 8.09
WTR YR 1981 TOTAL 15229.7 MEAN 41.7 MAX 116 MIN 8.3 CFSM .53 IN 7.15

04161000 CLINTON RIVER AT AUBURN HEIGHTS, MI

LOCATION.--Lat 42°38'00", long 83°13'28", in NW¼ sec.36, T.3 N., R.10 E., Oakland County, Hydrologic Unit 04090003, on right bank 30 ft (9 m) upstream from bridge on Auburn Road at Auburn Heights, and 2.8 mi (4.5 km) upstream from Galloway Creek.

DRAINAGE AREA.--123 mi^2 (319 mi^2).

PERIOD OF RECORD.--May 1935 to June 1939 and February to September 1940 (published as "at Pontiac"), October 1956 to current year.

REVISED RECORDS.--WSP 1307: 1937(M). WSP 1507: Drainage area at former site.

GAGE.--Water-stage recorder. Datum of gage is 846.50 ft (258.013 m) National Geodetic Vertical Datum of 1929. Prior to October 1940, nonrecording gage at site 3.3 mi (5.3 km) upstream at datum 876.01 ft (267.008 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for period of no gage-height record, Oct. 9 to Nov. 12, which are fair. Some regulation by many lakes above station. Flow includes waste from city of Pontiac water supply, most of which is obtained from sources outside the basin. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years (water years 1936-38, 1957-81), 102 ft^3/s (2.889 m^3/s), 11.26 in/yr (286 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft^3/s (50.4 m^3/s) Sept. 30, 1981, gage height, 5.41 ft (1.649 m); minimum observed, 4.8 ft^3/s (0.14 m^3/s) Sept. 4, 1936, site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,780 ft^3/s (50.4 m^3/s) Sept. 30, gage height, 5.41 ft (1.649 m); minimum, 46 ft^3/s (1.30 m^3/s) July 12, 18, 23; minimum gage height, 1.21 ft (0.369 m) July 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	115	86	92	90	76	186	122	159	67	61	53	71
2	143	84	172	92	93	193	109	153	66	59	51	61
3	124	82	85	91	87	186	118	147	69	56	54	115
4	176	79	78	90	84	200	131	158	68	55	54	231
5	166	76	96	95	83	208	115	154	68	53	52	80
6	166	74	117	99	86	195	113	148	63	54	53	113
7	154	73	137	101	83	154	103	138	57	55	76	150
8	133	71	168	99	79	159	103	119	108	57	63	174
9	115	68	125	100	81	179	126	117	79	65	58	188
10	105	66	112	94	86	207	115	224	72	60	57	188
11	100	65	91	90	161	194	214	220	64	55	57	187
12	95	65	121	96	96	193	190	144	65	50	54	182
13	92	64	119	96	91	164	132	129	78	62	52	175
14	96	66	105	92	93	158	214	112	78	58	54	177
15	110	61	112	88	98	158	168	150	78	53	97	161
16	105	61	112	85	174	156	160	110	71	53	50	168
17	100	67	113	83	268	150	160	90	69	54	54	143
18	97	69	116	79	323	143	147	87	97	49	52	121
19	96	66	118	82	257	136	142	98	104	52	52	112
20	98	76	114	79	196	129	138	125	91	56	55	109
21	98	91	112	76	165	150	121	153	88	54	54	160
22	98	88	113	80	184	128	131	157	177	52	53	192
23	98	86	113	79	262	129	258	151	107	52	51	123
24	98	90	106	78	212	118	173	150	85	54	55	117
25	97	91	96	77	188	86	158	151	73	49	58	116
26	95	86	96	78	183	145	152	138	59	52	57	113
27	94	88	95	66	195	104	154	134	60	51	60	123
28	93	99	94	67	208	95	188	83	54	202	71	115
29	92	89	97	68	---	116	188	67	58	74	97	116
30	90	84	98	69	---	129	159	70	63	61	101	332
31	88	---	92	69	---	119	---	60	---	58	58	---
TOTAL	3429	2311	3415	2628	4192	4767	4502	4096	2336	1876	1863	4413
MEAN	111	77.0	110	84.8	150	154	150	132	77.9	60.5	60.1	147
MAX	176	99	172	101	323	208	258	224	177	202	101	332
MIN	88	61	78	66	76	86	103	60	54	49	50	61

CAL YR 1980 TOTAL 44260 MEAN 121 MAX 431 MIN 45
WTR YR 1981 TOTAL 39828 MEAN 109 MAX 332 MIN 49

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE¼ sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft (4 m) downstream from wooden bridge on Oakland University property, and 2.7 mi (4.3 km) northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi² (46.4 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 820.78 ft (250.174 m) National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 9.89 ft³/s (0.280 m³/s), 7.50 in/yr (190 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft³/s (10.4 m³/s) June 25, 1968, gage height, 6.27 ft (1.911 m); minimum, 0.01 ft³/s (<0.001 m³/s) on several days during July and August, 1964; minimum gage height, 0.82 ft (0.250 m) Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 124 ft³/s (3.51 m³/s) Sept. 30, stage rising, peak occurred Oct. 1, 1981; maximum peak discharge, 108 ft³/s (3.06 m³/s) Feb. 18, gage height, 4.65 ft (1.417 m), only peak above base of 90 ft³/s (2.55 m³/s); minimum, 0.89 ft³/s (0.025 m³/s) July 24, 25, 26; minimum gage height, 1.69 ft (0.515 m) on many days in July and August.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	4.6	5.2	3.3	3.2	30	15	20	6.5	2.0	1.7	3.6
2	10	4.5	17	3.3	3.3	26	13	17	6.0	1.9	1.5	4.9
3	7.8	4.4	12	3.3	3.3	22	12	15	5.6	1.8	1.3	5.6
4	7.6	4.5	10	3.3	3.3	20	12	14	5.6	1.7	1.2	46
5	7.1	4.4	8.6	3.3	3.3	18	13	13	5.1	1.7	1.2	37
6	6.6	4.3	8.4	3.3	3.3	16	11	11	4.7	1.6	1.1	21
7	6.4	4.4	16	3.2	3.3	15	10	10	4.3	1.5	2.3	15
8	5.9	4.8	26	3.2	3.3	15	9.5	9.3	5.4	1.4	1.7	12
9	5.5	4.4	27	3.2	3.3	14	11	8.8	5.6	1.4	1.6	10
10	5.1	4.6	21	3.2	3.3	14	10	19	5.0	1.6	1.4	9.0
11	4.9	4.3	15	3.2	6.0	14	22	58	4.5	1.4	1.5	8.0
12	4.8	4.1	12	3.1	10	14	38	48	4.0	1.3	1.4	7.3
13	4.8	4.0	10	3.1	8.0	14	37	33	4.4	1.9	1.3	6.7
14	4.9	4.3	8.0	3.1	7.0	13	50	25	4.9	1.4	1.2	6.4
15	5.4	4.3	7.0	3.1	6.5	13	39	36	5.0	1.2	3.2	6.2
16	5.3	4.1	6.0	3.1	12	13	29	46	4.4	1.3	1.8	6.4
17	5.3	4.0	5.2	3.1	40	12	25	33	3.9	1.2	1.6	8.2
18	5.4	4.0	4.8	3.1	80	11	21	24	3.4	1.2	1.5	8.0
19	5.1	3.7	4.5	3.1	96	11	17	18	2.9	1.2	1.3	7.5
20	5.0	3.6	4.3	3.1	93	10	15	15	2.7	1.2	1.3	7.1
21	5.4	3.6	4.0	3.1	99	10	13	12	2.5	1.2	1.2	8.0
22	5.2	3.5	3.9	3.1	86	9.8	12	11	7.2	1.1	1.2	20
23	5.0	3.5	3.7	3.1	95	9.6	46	9.5	6.1	1.0	1.3	13
24	4.8	3.6	3.7	3.1	89	9.6	39	11	4.9	.96	1.2	11
25	6.2	3.6	3.6	3.1	63	9.6	29	10	4.3	.89	1.3	9.8
26	5.5	3.3	3.5	3.5	44	16	24	8.5	3.6	.96	1.2	9.2
27	5.1	3.4	3.5	4.0	35	19	20	9.5	2.9	1.0	1.3	8.8
28	5.0	4.5	3.4	4.0	34	17	21	9.3	2.5	7.0	2.4	7.8
29	4.8	4.6	3.4	3.5	---	16	27	8.0	2.1	3.6	3.8	7.3
30	4.6	4.6	3.4	3.5	---	16	24	7.7	2.0	2.7	8.0	18
31	4.5	---	3.4	3.5	---	16	---	7.2	---	2.0	3.2	---
TOTAL	175.4	123.5	267.5	101.2	936.4	463.6	664.5	576.8	132.0	52.31	57.2	348.8
MEAN	5.66	4.12	8.63	3.26	33.4	15.0	22.2	18.6	4.40	1.69	1.85	11.6
MAX	10	4.8	27	4.0	99	30	50	58	7.2	7.0	8.0	46
MIN	4.5	3.3	3.4	3.1	3.2	9.6	9.5	7.2	2.0	.89	1.1	3.6
CFSM	.32	.23	.48	.18	1.87	.84	1.24	1.04	.25	.09	.10	.65
IN.	.36	.26	.56	.21	1.95	.96	1.38	1.20	.27	.11	.12	.72

CAL YR 1980 TOTAL 4064.10 MEAN 11.1 MAX 100 MIN 2.1 CFSM .62 IN 8.45
WTR YR 1981 TOTAL 3899.21 MEAN 10.7 MAX 99 MIN .89 CFSM .60 IN 8.10

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW¼ SE¼ sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi (2.4 km) upstream from mouth.

DRAINAGE AREA.--70.9 mi^2 (183.6 km^2).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft (230.158 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 50.7 ft^3/s (1.436 m^3/s), 9.71 in/yr (247 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft^3/s (26.0 m^3/s) Feb. 1, 1968; maximum gage height, 5.95 ft (1.814 m) Feb. 10, 1965, backwater from ice; minimum discharge, 1.2 ft^3/s (0.034 m^3/s) Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft (0.384 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft^3/s (5.66 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 18	2400	326	9.23	3.29	1.003	Sept. 5	0100	230	6.51	2.94	0.896
Feb. 23	0800	300	8.50	3.20	0.975	Sept. 30	2030	*a638	18.1	*4.18	1.274
Aug. 7	0700	243	6.88	2.99	0.911						

a Stage rising, peak occurred Oct. 1, 1981.

Minimum discharge, 14 ft^3/s (0.40 m^3/s) on many days in July and August; minimum gage height, 1.51 ft (0.460 m) Aug. 24, 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	36	41	29	33	127	58	85	37	17	19	31
2	49	35	65	28	35	112	54	79	36	17	18	93
3	48	35	53	28	34	97	52	73	38	16	19	78
4	45	35	44	28	32	88	54	69	38	20	19	203
5	40	35	41	28	30	81	53	66	37	23	17	201
6	40	35	42	28	29	75	50	62	40	20	17	183
7	40	35	55	28	29	69	48	58	35	18	35	172
8	39	42	75	28	28	66	47	53	41	17	25	146
9	40	40	73	28	29	65	52	52	39	23	27	123
10	39	39	61	28	33	65	49	85	24	22	25	116
11	43	37	53	28	40	63	73	167	21	18	23	112
12	44	37	49	28	45	62	103	132	20	18	22	107
13	41	38	47	28	44	61	87	112	22	23	20	84
14	40	39	44	28	43	58	140	110	28	20	20	76
15	45	36	41	29	41	57	121	146	35	17	31	82
16	46	36	38	29	42	57	102	157	32	17	23	79
17	44	37	36	29	60	55	98	129	32	17	20	84
18	44	39	34	29	210	53	92	110	32	16	18	76
19	41	37	33	30	266	61	84	98	32	17	17	69
20	40	36	32	31	194	57	79	85	32	17	17	62
21	54	36	31	30	178	55	73	76	31	17	16	70
22	52	35	30	30	187	52	72	69	54	16	16	108
23	50	35	30	29	280	52	138	62	46	16	15	81
24	44	37	30	28	238	50	102	69	54	16	14	70
25	47	37	30	28	199	49	85	65	48	15	14	79
26	43	35	30	31	174	63	78	53	40	16	14	97
27	40	37	29	30	150	70	73	59	35	16	16	95
28	39	40	29	29	144	62	90	55	32	47	27	81
29	38	40	29	29	---	61	100	49	30	32	31	73
30	37	40	29	29	---	61	92	35	19	24	40	149
31	37	---	29	29	---	62	---	37	---	21	27	---
TOTAL	1325	1111	1283	892	2847	2066	2399	2557	1040	609	662	3080
MEAN	42.7	37.0	41.4	28.8	102	66.6	80.0	82.5	34.7	19.6	21.4	103
MAX	54	42	75	31	280	127	140	167	54	47	40	203
MIN	36	35	29	28	28	49	47	35	19	15	14	31
CFSM	.60	.52	.58	.41	1.44	.94	1.13	1.16	.49	.28	.30	1.45
IN.	.70	.58	.67	.47	1.49	1.08	1.26	1.34	.55	.32	.35	1.62

CAL YR 1980 TOTAL 19346 MEAN 52.9 MAX 320 MIN 20 CFSM .75 IN 10.15
WTR YR 1981 TOTAL 19871 MEAN 54.4 MAX 280 MIN 14 CFSM .77 IN 10.43

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW¼ sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi (6.4 km) west of Romeo.

DRAINAGE AREA.--25.6 mi² (66.3 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft (262.628 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 17.3 ft³/s (0.490 m³/s), 9.18 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) Apr. 19, 1975, gage height, 5.19 ft (1.582 m); minimum, 0.92 ft³/s (0.026 m³/s) Oct. 5, 9, 1967; minimum gage height, 1.28 ft (0.390 m) July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 101 ft³/s (2.86 m³/s) Feb. 24, gage height, 3.59 ft (1.094 m), only peak above base of 100 ft³/s (2.83 m³/s); minimum, 1.4 ft³/s (0.040 m³/s) Aug. 24, 25, 26, 27; minimum gage height, 1.36 ft (0.415 m) June 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	8.5	12	8.6	9.0	45	18	23	11	3.9	2.4	4.2
2	19	8.0	15	8.6	9.8	39	14	20	11	3.9	2.2	11
3	16	7.6	14	8.5	9.0	33	13	17	8.5	3.0	2.2	9.0
4	15	6.9	13	8.5	8.5	31	14	15	5.4	3.5	2.1	37
5	13	9.3	13	8.4	8.0	29	15	11	4.8	3.9	2.2	36
6	10	9.0	13	8.4	8.0	25	12	10	4.6	3.2	2.5	35
7	13	8.8	15	8.3	8.0	26	11	8.8	4.0	3.0	4.4	27
8	12	9.3	19	8.2	8.0	27	10	8.5	4.4	3.0	3.5	25
9	10	9.5	20	8.1	8.5	26	12	8.5	5.0	2.8	3.2	25
10	9.5	7.1	19	8.0	10	26	10	20	4.4	2.5	2.5	21
11	10	9.8	18	8.0	14	24	18	52	4.0	2.4	3.0	20
12	10	7.1	16	8.0	13	23	19	47	4.2	2.4	3.5	17
13	7.6	6.7	15	8.0	12	23	20	42	4.4	3.4	3.0	6.0
14	7.6	6.9	14	8.0	11	20	39	40	19	3.2	3.2	5.2
15	11	6.0	13	8.0	11	20	34	43	27	3.0	4.6	4.6
16	11	5.2	13	7.9	13	19	28	45	11	2.8	3.9	4.8
17	11	5.2	12	7.9	18	18	33	35	8.3	2.7	2.8	8.0
18	11	8.8	11	7.9	30	16	32	27	6.2	3.0	2.2	8.3
19	11	7.4	11	7.9	55	14	24	23	5.4	2.7	3.0	6.0
20	9.3	7.0	10	7.9	75	14	20	24	5.6	2.7	2.2	5.2
21	11	7.2	9.6	7.9	80	14	21	18	5.0	2.7	1.9	6.0
22	10	7.4	9.4	7.9	81	14	20	19	10	2.5	1.7	20
23	9.0	7.8	9.2	7.9	97	14	31	15	7.4	2.2	1.8	9.0
24	8.3	8.5	9.1	7.9	97	18	30	12	5.6	2.2	1.7	7.1
25	12	9.2	9.0	7.9	80	13	27	12	5.0	2.1	1.5	6.7
26	10	9.6	9.0	8.0	67	17	23	10	5.6	2.1	1.5	7.1
27	8.5	10	9.0	8.0	53	21	21	11	4.0	2.2	1.7	7.8
28	8.3	11	9.0	8.4	51	17	24	17	3.5	5.4	4.0	6.9
29	9.8	11	8.9	8.4	---	19	30	14	3.4	5.4	4.2	6.0
30	9.5	10	8.8	8.0	---	26	27	13	3.4	3.2	6.2	10
31	9.3	---	8.7	8.3	---	26	---	12	---	2.8	4.4	---
TOTAL	338.7	245.8	385.7	251.7	944.8	697	650	672.8	211.1	93.8	89.2	401.9
MEAN	10.9	8.19	12.4	8.12	33.7	22.5	21.7	21.7	7.04	3.03	2.88	13.4
MAX	19	11	20	8.6	97	45	39	52	27	5.4	6.2	37
MIN	7.6	5.2	8.7	7.9	8.0	13	10	8.5	3.4	2.1	1.5	4.2
CFSM	.43	.32	.48	.32	1.32	.88	.85	.85	.28	.12	.11	.52
IN.	.49	.36	.56	.37	1.37	1.01	.94	.98	.31	.14	.13	.58

CAL YR 1980 TOTAL 6223.3 MEAN 17.0 MAX 111 MIN 3.7 CFSM .66 IN 9.04
WTR YR 1981 TOTAL 4982.5 MEAN 13.7 MAX 97 MIN 1.5 CFSM .54 IN 7.24

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft (305 m) east of bridge over dam on Stony Creek, and 2.7 mi (4.3 km) west of Washington.

DRAINAGE AREA.--68.0 mi^2 (176.1 km^2).

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft (240.792 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations NGVD.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft (242.6 m), maximum of 802 ft (244.4 m); and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft (5.73 hm^3) at elevation of 802 ft (244.4 m). The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft (6.78 hm^3) May 17, 18, 1974, Apr. 20, 1975, elevation 803.6 ft (244.94 m); minimum recorded, 1,758 acre-ft (2.17 hm^3) Nov. 21, 1967, elevation, 794.7 ft (242.22 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,065 acre-ft (6.25 hm^3) May 16, elevation, 802.80 ft. (244.69 m); minimum, 3,660 acre-ft (4.51 hm^3) occurred sometime during period Dec. 21 to Jan. 20, elevation, 799.95 ft (243.82 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month Acre-feet	Change in contents during month Equivalent in ft^3/s
Sept. 30	*802.3	4805	--	--
Oct. 31	800.6	3961	-844	-13.7
Nov. 30	800.0	3683	-278	-4.7
Dec. 31	800.0	3683	0	0
CAL YR 1980	--	--	0	0
Jan. 31	800.0	3683	0	0
Feb. 28	801.8	4549	+866	+15.6
Mar. 31	801.5	4399	-150	-2.4
Apr. 30	802.1	4701	+302	+5.1
May 31	802.3	4805	+104	+1.7
June 30	802.1	4701	-104	-1.7
July 31	802.1	4701	0	0
Aug. 31	802.2	4753	+52	+0.8
Sept. 30	802.3	4805	+52	+0.9
WTR YR 1981	--	--	0	0

*Estimated

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 15 ft (5 m) downstream from bridge on Mt. Vernon Road, 500 ft (152 m) downstream from Stony Lake Dam, and 2.9 mi (4.7 km) west of Washington.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft (235.485 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records fair except those for period of no gage-height record, Oct. 13 to Nov. 14, which are poor. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (station 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 41.4 ft³/s (1.172 m³/s), 8.24 in/yr (209 mm/yr), adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft³/s (12.1 m³/s) Feb. 2, 1968, gage height, 5.86 ft (1.786 m); maximum gage height, 6.71 ft (2.045 m) Mar. 6, 1959, backwater from ice; minimum discharge 0.9 ft³/s (0.025 m³/s) July 10, 1963; minimum gage height, 1.79 ft (0.546 m) Apr. 6, 1979; minimum daily discharge, 1.3 ft³/s (0.037 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 257 ft³/s (7.28 m³/s) Feb. 23, gage height, 4.95 ft (1.509 m); minimum daily, 5.2 ft³/s (0.15 m³/s) July 11; minimum gage height, 2.11 ft (0.643 m) Apr. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	77	34	30	30	120	65	72	33	8.6	16	28
2	36	55	45	29	32	110	60	67	32	7.1	14	35
3	42	38	48	28	30	99	54	62	31	7.8	13	37
4	40	27	46	27	27	91	51	56	30	9.1	12	62
5	35	32	44	27	26	85	50	47	26	11	11	80
6	31	30	41	28	26	78	44	47	23	9.3	10	82
7	37	30	45	27	26	71	39	31	17	8.2	18	77
8	34	30	53	26	25	68	35	29	19	7.5	19	72
9	31	29	61	26	25	67	39	28	24	7.8	17	64
10	28	29	63	26	31	67	22	40	21	6.4	16	61
11	28	28	57	25	45	66	19	48	16	5.2	16	58
12	25	26	53	25	42	64	48	71	16	6.4	15	52
13	22	27	48	25	40	62	42	84	15	13	15	45
14	20	28	44	25	37	59	62	86	18	14	15	40
15	30	25	40	25	35	57	79	91	29	9.9	19	32
16	30	24	38	25	37	56	86	95	41	10	20	31
17	30	24	37	25	49	53	85	92	36	11	13	38
18	30	23	35	25	90	50	83	82	27	11	12	38
19	30	22	34	25	154	47	76	71	22	10	12	34
20	25	22	31	25	199	45	73	62	15	12	11	32
21	42	23	30	25	221	44	56	55	13	14	11	31
22	66	23	29	25	220	44	51	48	22	11	13	46
23	62	25	29	25	180	44	78	46	23	7.4	11	48
24	60	29	31	25	122	44	86	46	21	8.1	11	46
25	64	30	28	25	146	44	81	49	21	7.7	8.2	42
26	69	30	27	25	170	51	74	46	16	9.5	8.3	39
27	61	32	27	26	148	62	69	46	12	9.4	8.1	38
28	68	34	29	27	134	63	75	44	11	19	15	35
29	74	34	30	27	---	61	60	41	8.8	23	23	33
30	71	33	30	25	---	62	62	43	11	21	31	38
31	47	---	30	25	---	65	---	38	---	19	30	---
TOTAL	1296	919	1217	804	2347	1999	1804	1763	649.8	334.4	463.6	1394
MEAN	41.8	30.6	39.3	25.9	83.8	64.5	60.1	56.9	21.7	10.8	15.0	46.5
MAX	74	77	63	30	221	120	86	95	41	23	31	82
MIN	20	22	27	25	25	44	19	28	8.8	5.2	8.1	28
MEAN +	28.1	25.9	39.3	25.9	99.4	62.1	65.2	58.6	20.0	10.8	15.8	47.4
CFSM +	.41	.38	.58	.38	1.46	.91	.96	.86	.29	.16	.23	.70
IN +	.48	.42	.66	.44	1.52	1.05	1.07	.99	.33	.18	.27	.77

CAL YR 1980	TOTAL 16652.0	MEAN 45.5	MAX 183	MIN 14	MEAN + 45.5	CFSM + .67	IN + 9.08
WTR YR 1981	TOTAL 14990.8	MEAN 41.1	MAX 221	MIN 5.2	MEAN + 41.1	CFSM + .60	IN + 8.18

+ Adjusted for change in contents in Stony Lake.

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI

LOCATION.--Lat 42°36'52", long 83°01'36", in NE¼ SW¼ sec.3, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on Riverland Road at Sterling Heights.

DRAINAGE AREA.--309 mi² (800 km²).

PERIOD OF RECORD.--October 1978 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 625 ft (190 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,500 ft³/s (70.8 m³/s) Apr. 14, 1979; minimum, 65 ft³/s (1.84 m³/s) Sept. 7, 10, 1979, gage height, 6.77 ft (2.063 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft³/s (25.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 19	1000	*1220	34.6	*12.42	3.786	Feb. 23	1400	1160	32.9	12.22	3.725

Minimum discharge, 72 ft³/s (2.04 m³/s) July 27, gage height, 6.83 ft (2.082 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	177	229	191	175	150	537	301	380	164	115	109	155
2	268	189	308	170	170	498	285	360	165	110	103	242
3	219	173	261	165	165	460	274	340	167	105	103	194
4	272	170	214	160	160	435	285	330	169	123	103	590
5	260	159	211	165	160	435	274	320	162	122	99	513
6	249	151	225	170	160	404	260	300	159	107	96	427
7	253	150	244	170	160	358	245	280	144	108	153	440
8	227	172	324	170	155	345	239	250	176	105	119	422
9	224	157	368	170	150	348	268	240	189	111	128	402
10	206	159	293	165	180	385	250	350	154	119	113	382
11	205	159	255	160	290	368	366	550	139	104	111	370
12	199	153	248	165	230	357	425	450	131	96	107	363
13	197	154	261	170	200	348	379	420	145	114	103	321
14	201	162	225	165	190	314	517	380	154	110	102	302
15	236	155	221	160	210	318	486	480	177	104	166	289
16	220	147	220	155	270	316	429	460	177	94	115	292
17	208	148	215	150	480	310	415	430	172	96	107	314
18	207	159	210	150	855	297	395	360	171	93	104	269
19	191	152	205	150	1100	293	362	330	186	89	97	240
20	188	151	200	150	858	277	351	317	167	97	103	223
21	215	169	195	150	785	280	313	315	154	99	103	220
22	239	170	190	150	734	289	297	304	255	96	102	461
23	226	167	190	147	1010	272	584	286	221	91	98	296
24	215	175	185	140	860	273	482	289	194	91	97	260
25	257	183	180	139	700	238	410	306	180	88	101	251
26	215	175	170	145	660	293	370	268	147	88	101	268
27	206	176	170	141	604	331	350	273	139	89	102	271
28	217	204	170	134	601	281	400	245	122	273	134	244
29	219	196	175	136	---	291	430	201	119	200	179	235
30	220	188	180	137	---	304	400	191	116	133	243	265
31	179	---	180	140	---	309	---	173	---	119	151	---
TOTAL	6815	5052	6924	4814	12247	10564	10842	10178	4915	3489	3652	9521
MEAN	220	168	223	155	437	341	361	328	164	113	118	317
MAX	272	229	368	175	1100	537	584	550	255	273	243	590
MIN	177	147	170	134	150	238	239	173	116	88	96	155
CFSM	.71	.54	.72	.50	1.41	1.10	1.17	1.06	.53	.37	.38	1.03
IN.	.82	.61	.83	.58	1.47	1.27	1.31	1.23	.59	.42	.44	1.15

CAL YR 1980 TOTAL 95220 MEAN 260 MAX 1110 MIN 110 CFSM .84 IN 11.46
WTR YR 1981 TOTAL 89013 MEAN 244 MAX 1100 MIN 88 CFSM .79 IN 10.72

04162010 RED RUN NEAR WARREN, MI

LOCATION.--Lat 42°31'46", long 83°04'07", in SE¼ NE¼ sec.6, T.1 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 15 ft (5 m) upstream from bridge on Ryan Road, and 1.0 mi (1.6 km) northwest of Warren.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 620 ft (189 m), from topographic map.

REMARKS.--Records poor. Diversion from Big Beaver Creek basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year. Gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,580 ft^3/s (73.1 m^3/s) Sept. 30, 1981, stage rising, peak occurred Oct. 1, 1981; maximum peak discharge, 2,110 ft^3/s (59.8 m^3/s) Aug. 3, 1980, gage height, 22.6 ft (6.89 m); minimum daily discharge, 1.1 ft^3/s (0.031 m^3/s) Feb. 4-20, 1980.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,100 ft^3/s (31.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 23	0300	1,100	31.2	15.07	4.593
July 28	0830	1,400	39.6	17.11	5.215
July 28	1415	1,400	39.6	17.05	5.197
Sep. 30	2400	*a2,580	73.1	*26.73	8.147

a Stage rising, peak occurred Oct. 1, 1981.

Minimum discharge, 1.6 ft^3/s (0.045 m^3/s) Aug. 25, gage height, 8.64 ft (2.633 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	2.3	4.6	2.4	6.0	19	7.6	9.3	3.5	3.1	4.5	75
2	41	2.3	70	2.3	13	16	5.5	6.3	3.9	3.0	3.8	28
3	7.7	2.6	11	2.1	7.0	12	5.3	5.3	9.6	2.8	5.0	42
4	8.1	2.6	6.3	1.9	4.0	11	8.0	5.4	4.8	37	5.4	162
5	4.8	2.5	5.4	1.8	3.5	9.9	5.4	6.6	3.2	11	3.2	24
6	4.4	3.0	5.7	1.7	3.0	7.3	4.4	3.8	2.8	3.6	2.9	11
7	5.7	3.9	64	1.7	2.8	5.4	4.3	3.7	3.1	3.4	31	6.4
8	4.1	7.4	116	1.7	2.6	5.0	4.2	26	58	3.8	7.1	5.5
9	3.0	2.7	40	1.7	2.5	5.1	20	130	16	17	13	3.9
10	3.5	3.2	17	1.7	2.5	8.4	3.9	13	4.6	8.4	3.9	3.5
11	5.5	2.5	8.5	1.7	75	6.3	73	25	3.6	3.7	8.6	3.6
12	3.6	2.1	7.0	1.7	54	7.5	89	72	3.3	2.8	4.4	3.2
13	2.4	1.9	5.8	1.7	24	8.5	50	48	35	4.2	2.0	2.9
14	9.1	7.5	4.7	1.7	26	6.0	140	15	31	3.2	2.5	7.0
15	11	2.6	3.9	1.7	43	6.0	50	9.5	10	2.8	81	3.3
16	5.5	1.9	3.4	1.7	226	5.5	16	100	6.4	6.6	7.1	38
17	4.2	1.8	3.0	1.7	489	6.6	33	50	5.8	3.5	4.1	42
18	4.4	1.9	2.9	1.8	262	5.5	27	27	3.7	3.0	5.2	16
19	2.5	1.9	2.8	1.8	124	4.7	9.8	15	3.4	3.0	3.7	5.5
20	3.0	1.9	2.6	1.8	82	5.1	7.3	8.4	3.0	14	3.3	4.0
21	2.7	1.9	2.6	1.9	51	4.7	6.1	6.5	3.6	7.6	2.0	31
22	1.9	1.9	2.6	2.0	53	4.4	20	6.2	51	3.4	2.1	104
23	1.8	2.1	2.7	2.2	160	5.6	272	6.0	11	3.5	2.7	9.9
24	3.9	4.2	2.8	2.4	73	7.1	33	5.5	5.3	5.1	4.6	5.7
25	23	2.9	3.0	4.0	35	6.0	16	6.6	4.0	3.8	1.8	4.5
26	4.2	2.0	2.9	10	23	44	11	4.6	3.3	12	3.1	4.2
27	2.9	20	2.8	8.0	18	19	9.0	46	2.9	4.2	2.4	8.9
28	7.9	21	2.7	6.0	35	9.2	41	11	2.6	526	9.9	3.5
29	3.7	7.9	2.7	4.5	---	7.5	36	5.8	2.7	32	53	3.0
30	2.7	4.1	2.7	4.0	---	21	15	14	3.0	12	85	220
31	2.6	---	2.6	3.5	---	12	---	4.6	---	5.6	9.1	---
TOTAL	197.2	126.5	414.7	84.8	1899.9	301.3	1022.8	696.1	304.1	755.1	377.4	881.5
MEAN	6.36	4.22	13.4	2.74	67.9	9.72	34.1	22.5	10.1	24.4	12.2	29.4
MAX	41	21	116	10	489	44	272	130	58	526	85	220
MIN	1.8	1.8	2.6	1.7	2.5	4.4	3.9	3.7	2.6	2.8	1.8	2.9

CAL YR 1980 TOTAL 9780.2 MEAN 26.7 MAX 518 MIN 1.1
WTR YR 1981 TOTAL 7061.4 MEAN 19.3 MAX 526 MIN 1.7

04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW¼ SW¼ sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi (1.6 km) north of Warren, and 2.0 mi (3.2 km) upstream from mouth.

DRAINAGE AREA.--Indeterminate since 1976. Prior to 1976, 23.5 mi² (60.9 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft (182.514 m) Macomb County datum. Prior to Aug. 26, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records poor. Diversion from the basin via Henry-Graham drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft³/s (35.1 m³/s) June 26, 1968, gage height, 14.45 ft (4.404 m); no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum discharge affected by diversion since 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 464 ft³/s (13.1 m³/s) Sept. 30, stage rising, peak occurred Oct. 1, 1981; maximum peak discharge, 202 ft³/s (5.72 m³/s) Feb. 16, gage height, 7.62 ft (2.323 m); minimum daily, 0.01 ft³/s (<.001 m³/s) Aug. 27; minimum gage height, 4.77 ft (1.454 m) Dec. 22, Feb. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.54	.54	.46	.11	.20	3.9	.84	2.9	.47	.22	.46	7.4
2	1.7	.46	22	.11	.20	2.8	.58	1.2	.41	.33	.59	6.9
3	1.5	.39	3.7	.11	.21	1.9	.53	.99	.65	.46	.57	2.5
4	.82	.39	.94	.10	.21	1.8	.66	.82	.53	16	.38	30
5	.62	.33	.82	.10	.21	1.8	.56	.71	.28	17	.29	5.5
6	.54	.27	.82	.10	.21	1.4	.43	.79	.25	7.2	.22	.56
7	.62	.33	24	.10	.21	1.2	.37	.56	.18	1.5	8.1	.33
8	.62	.82	38	.10	.21	1.1	.38	.55	9.6	1.4	5.0	.27
9	.54	.62	17	.10	.21	1.1	1.5	.55	3.5	2.8	.60	.12
10	.46	.46	2.8	.10	.21	1.1	.85	13	.45	1.5	.28	.07
11	.46	.33	1.5	.10	30	.96	21	26	.23	.71	.81	.03
12	.54	.22	.90	.10	17	.90	31	3.9	.18	.62	.27	.07
13	.54	.22	.80	.10	9.0	.82	8.6	3.2	2.4	.62	.15	.05
14	.71	.94	.65	.10	8.0	.70	66	3.5	4.6	.46	.09	.08
15	1.1	.54	.45	.10	12	.69	12	25	1.5	.46	8.6	.05
16	.71	.46	.40	.10	108	.64	3.4	15	.43	.62	1.2	1.6
17	.54	.27	.35	.10	147	.66	4.0	3.2	.24	.39	.21	3.6
18	.82	.22	.30	.10	89	.63	12	1.7	.21	.27	.13	1.0
19	.62	.18	.25	.10	42	.55	2.2	1.2	.15	.22	.19	.33
20	.62	.22	.22	.11	27	.54	1.4	.97	.18	.62	.11	.11
21	.54	.22	.20	.11	14	.54	1.0	.77	.28	.39	.06	2.1
22	.54	.27	.18	.12	15	.49	1.3	.68	7.7	.27	.03	19
23	.54	.27	.16	.13	58	.54	55	.66	2.9	.18	.02	.69
24	.62	.46	.15	.14	27	.52	11	.69	.64	.09	.03	.17
25	4.9	.82	.14	.15	9.4	.46	3.1	.65	.34	.11	.05	.12
26	1.4	.46	.13	.16	4.8	9.6	1.8	.56	.19	.39	.03	.10
27	1.2	4.9	.12	.17	3.1	3.5	1.4	5.2	.16	.33	.01	.18
28	1.9	6.2	.12	.17	7.1	1.0	8.1	1.8	.18	56	.07	.10
29	.54	1.1	.11	.18	---	.79	12	.62	.14	11	4.4	.07
30	.62	.62	.11	.19	---	2.2	2.9	1.5	.18	1.5	19	41
31	.62	---	.11	.19	---	1.9	---	.74	---	.66	.37	---
TOTAL	28.04	23.53	117.89	3.75	629.48	46.73	265.90	119.61	39.15	124.32	52.32	124.10
MEAN	.90	.78	3.80	.12	22.5	1.51	8.86	3.86	1.31	4.01	1.69	4.14
MAX	4.9	6.2	38	.19	147	9.6	66	26	9.6	56	19	41
MIN	.46	.18	.11	.10	.20	.46	.37	.55	.14	.09	.01	.03

CAL YR 1980 TOTAL 1589.70 MEAN 4.34 MAX 124 MIN .07
WTR YR 1981 TOTAL 1574.82 MEAN 4.31 MAX 147 MIN .01

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE¼ NE¼ sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi (1.6 km) southwest of Utica.

DRAINAGE AREA.--16.5 mi² (42.7 km²).

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft (188.912 m) National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 12.7 ft³/s (0.360 m³/s), 10.45 in/yr (265 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft³/s (32.9 m³/s) June 26, 1968, gage height, 10.36 ft (3.158 m); no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft (0.375 m) Sept. 16, 1967.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 331 ft³/s (9.37 m³/s) Feb. 17, gage height, 7.63 ft (2.326 m), only peak above base of 200 ft³/s (5.66 m³/s); minimum, 0.49 ft³/s (0.014 m³/s) Aug. 24, gage height, 1.63 ft (0.497 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	2.4	4.7	2.8	2.9	29	9.0	12	4.2	1.5	3.1	6.0
2	8.2	2.6	20	2.7	2.9	20	7.2	10	4.4	1.3	2.4	18
3	6.0	2.2	15	2.7	2.9	13	6.2	8.8	5.8	1.2	3.1	7.1
4	5.1	2.4	6.5	2.7	2.9	13	6.2	7.9	5.6	33	1.9	39
5	4.2	2.2	5.6	2.7	2.9	13	5.8	7.3	3.9	28	1.3	24
6	3.8	2.4	5.8	2.7	2.9	11	5.0	6.1	3.2	6.7	1.1	9.6
7	4.2	2.6	20	2.7	2.9	9.3	4.9	5.4	2.5	4.4	2.3	6.4
8	3.7	3.5	44	2.7	2.9	9.0	6.3	4.7	11	3.7	3.3	4.8
9	2.4	3.5	43	2.7	2.9	9.4	7.5	4.4	7.5	3.4	8.7	5.2
10	2.1	3.5	17	2.7	3.5	9.3	5.8	18	4.2	3.6	2.6	8.3
11	2.1	6.3	15	2.7	50	8.8	39	94	3.1	2.3	2.0	8.0
12	2.1	2.8	7.0	2.7	20	8.1	65	36	2.4	1.6	1.6	7.3
13	2.2	2.2	6.0	2.7	14	7.8	36	18	5.7	1.9	1.3	6.9
14	2.6	2.2	5.0	2.7	13	6.6	110	16	7.4	1.6	1.2	3.4
15	4.0	2.1	4.0	2.7	15	6.9	43	39	6.2	1.2	10	1.8
16	4.0	1.9	3.5	2.7	80	7.2	25	48	4.0	1.2	4.9	2.9
17	3.5	1.9	3.0	2.7	251	6.8	21	20	2.9	1.2	2.6	8.4
18	3.1	2.1	3.0	2.7	285	5.3	17	13	2.0	1.3	1.5	6.9
19	2.9	2.1	3.0	2.7	189	5.5	14	11	1.7	1.2	1.2	3.8
20	3.3	1.9	2.8	2.7	97	5.4	12	8.8	1.6	1.6	1.1	2.7
21	3.3	1.9	2.8	2.7	63	5.3	9.8	8.3	1.6	1.5	1.0	3.3
22	3.1	1.8	2.7	2.7	51	5.1	9.9	7.2	9.8	.98	.80	25
23	2.8	1.7	2.7	2.8	115	5.3	107	5.6	9.6	.91	.76	9.0
24	6.8	1.9	2.6	2.9	72	5.8	38	6.7	4.7	.77	.64	5.3
25	5.8	2.1	2.6	3.0	43	5.9	23	14	3.5	.86	.65	3.7
26	4.2	1.8	2.6	3.2	32	16	17	7.0	2.5	1.3	.70	3.3
27	3.5	2.6	2.6	3.2	25	20	14	12	2.0	1.2	.63	3.4
28	3.8	7.3	2.6	3.2	38	11	14	12	1.7	41	1.2	2.7
29	2.9	6.5	2.7	3.1	---	10	23	7.1	1.5	21	3.5	2.3
30	2.2	5.8	2.8	3.0	---	12	16	6.7	1.5	6.7	17	23
31	2.1	---	2.8	3.0	---	12	---	5.4	---	4.4	6.0	---
TOTAL	112.6	86.2	263.4	86.9	1482.6	312.8	717.6	480.4	127.7	182.52	90.08	261.5
MEAN	3.63	2.87	8.50	2.80	53.0	10.1	23.9	15.5	4.26	5.89	2.91	8.72
MAX	8.2	7.3	44	3.2	285	29	110	94	11	41	17	39
MIN	2.1	1.7	2.6	2.7	2.9	5.1	4.9	4.4	1.5	.77	.63	1.8
CFSM	.22	.17	.52	.17	3.21	.61	1.45	.94	.26	.36	.18	.53
IN.	.25	.19	.59	.20	3.34	.71	1.62	1.08	.29	.41	.20	.59

CAL YR 1980 TOTAL 4501.80 MEAN 12.3 MAX 245 MIN 1.0 CFSM .75 IN 10.15
WTR YR 1981 TOTAL 4204.30 MEAN 11.5 MAX 285 MIN .63 CFSM .70 IN 9.48

04163900 RED RUN NEAR CADY, MI

LOCATION.--Lat 42°34'08", long 82°58'14", in SW¼ SW¼ sec.19, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 50 ft (15 m) upstream from bridge on Utica Road, 200 ft (61 m) upstream from mouth, 550 ft (168 m) downstream from Plum Brook, and 0.7 mi (1.1 km) northwest of Cady.

PERIOD OF RECORD.--October 1979 to current year (gage heights only).

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m) from topographic map (nearest 5 ft).

REMARKS.--Records good.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 17.58 ft (5.358 m) Apr. 4, 1980; minimum, 6.65 ft (2.027 m) Aug. 24, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 17.01 ft (5.185 m) Sept. 30, stage still rising, peak occurred Oct. 1, 1981; maximum peak gage height, 14.79 ft (4.508 m) July 28; minimum gage height, 6.65 ft (2.027 m) Aug. 24.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.60	---	7.64	7.60	7.70	10.09	8.40	8.96	7.44	7.01	7.13	8.26
2	8.91	---	9.36	7.54	8.51	9.78	8.27	8.82	7.45	6.96	6.97	9.22
3	8.04	---	8.87	7.43	7.64	9.54	8.15	8.63	7.55	6.94	6.92	7.91
4	8.25	---	8.04	7.31	7.48	9.33	8.18	8.53	7.61	7.71	6.96	11.64
5	8.23	---	7.90	7.64	7.42	9.31	8.13	8.49	7.42	8.55	6.91	10.68
6	8.09	---	7.96	7.74	7.56	9.12	8.01	8.40	7.37	7.18	6.86	9.36
7	8.15	---	9.39	7.72	7.52	8.88	7.94	8.24	7.23	7.06	7.79	9.18
8	7.99	---	10.35	7.59	7.46	8.67	7.89	8.02	8.20	7.00	8.67	9.13
9	7.91	---	10.25	7.62	7.38	8.72	8.23	7.94	8.34	7.35	7.42	8.98
10	7.84	---	8.98	7.62	7.46	8.88	8.04	8.86	7.46	7.54	7.06	8.81
11	7.76	---	8.50	7.50	12.17	8.90	9.85	11.87	7.24	7.00	7.09	8.75
12	7.69	---	8.26	7.54	8.70	8.80	10.42	10.51	7.14	6.86	7.07	8.68
13	7.66	---	8.33	7.63	8.16	8.78	9.61	9.43	7.72	6.95	6.93	8.45
14	7.75	7.63	8.05	7.65	8.29	8.49	12.74	9.31	7.98	7.06	6.91	8.47
15	8.28	7.45	7.91	7.62	8.49	8.46	10.95	10.34	7.76	6.93	8.90	8.25
16	7.91	7.32	7.94	7.63	10.43	8.46	9.71	10.96	7.60	6.86	7.32	8.41
17	7.88	7.28	7.77	7.51	13.53	8.46	9.55	9.62	7.46	6.86	6.96	9.50
18	7.91	7.39	7.96	7.49	13.58	8.37	9.68	9.04	7.37	6.88	6.93	8.63
19	7.65	7.35	7.78	7.52	13.28	8.28	9.03	8.69	7.47	6.79	6.88	8.05
20	7.63	7.34	7.55	7.60	12.86	8.21	8.78	8.59	7.38	7.24	6.88	7.84
21	7.71	7.42	7.57	7.52	11.74	8.20	8.57	8.53	7.25	7.22	6.83	7.90
22	8.01	7.45	7.63	7.47	11.22	8.21	8.43	8.44	8.91	6.93	6.84	11.12
23	7.85	7.43	7.77	7.59	13.02	8.12	12.56	8.31	8.18	6.78	6.78	8.79
24	7.82	7.51	7.80	7.52	12.75	8.14	10.76	8.16	7.67	6.78	6.75	8.26
25	8.62	7.69	7.48	7.53	11.45	8.00	9.62	8.50	7.55	6.77	6.80	8.11
26	7.95	7.56	7.48	8.06	10.76	8.74	9.16	8.21	7.31	6.95	6.80	8.12
27	7.80	7.78	7.51	7.91	10.33	9.15	8.93	8.69	7.18	6.87	6.77	8.18
28	7.93	8.20	7.55	7.60	10.45	8.37	9.37	8.50	7.03	11.77	7.26	7.99
29	7.89	7.84	7.68	7.47	---	8.30	10.25	7.84	6.96	9.88	8.63	7.91
30	7.89	7.69	7.72	7.37	---	8.59	9.23	7.96	7.00	7.65	9.46	8.90
31	7.62	---	7.65	7.30	---	8.66	---	7.62	---	7.36	7.54	---
MEAN	7.94	---	8.15	7.58	9.91	8.71	9.28	8.84	7.54	7.34	7.26	8.78
MAX	8.91	---	10.35	8.06	13.58	10.09	12.74	11.87	8.91	11.77	9.46	11.64
MIN	7.60	---	7.48	7.30	7.38	8.00	7.89	7.62	6.96	6.77	6.75	7.84

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW¼ sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft (244 m) downstream from bridge on Garfield Road, 2.8 mi (4.5 km) north of Fraser, and 4.0 mi (6.4 km) upstream from North Branch.

DRAINAGE AREA.--444 mi^2 (1,150 km^2).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft (176.086 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft (244 m) upstream at same datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--34 years, 369 ft^3/s (10.45 m^3/s), 11.29 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,000 ft^3/s (227 m^3/s) May 11, 1948, gage height, 19.5 ft (5.94 m), from graph based on gage readings, from rating curve extended above 4,000 ft^3/s (113 m^3/s); minimum, 47 ft^3/s (1.33 m^3/s) Sept. 6, 1955; minimum gage height, 4.29 ft (1.308 m) Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft (6.1 m), from floodmarks, discharge, 9,000 ft^3/s (255 m^3/s), from rating curve extended above 4,000 ft^3/s (113 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,000 ft^3/s (56.6 m^3/s) July 28, gage height, 13.00 ft (3.962 m), only peak above base of 2,000 ft^3/s (56.6 m^3/s); minimum, 109 ft^3/s (3.09 m^3/s) July 25, gage height, 5.16 ft (1.573 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	240	246	231	230	236	700	371	483	220	151	172	355
2	400	231	534	221	393	633	350	458	221	145	151	560
3	290	203	438	202	239	586	330	426	237	142	144	293
4	320	208	291	200	234	545	337	407	244	258	150	1040
5	330	191	270	200	202	541	329	401	215	428	144	853
6	310	186	280	200	219	505	308	383	207	177	136	566
7	300	182	558	200	215	461	294	355	184	159	281	527
8	290	234	756	200	209	421	284	318	340	151	477	514
9	280	194	730	200	196	428	342	304	376	197	224	488
10	270	191	477	200	198	458	310	489	222	239	166	459
11	260	195	389	200	600	461	657	1150	188	150	169	445
12	250	192	349	200	461	445	765	814	173	133	166	432
13	260	184	361	191	319	440	603	581	260	143	146	389
14	290	227	312	191	325	388	1360	559	309	158	142	391
15	280	199	290	188	364	383	890	784	271	140	471	353
16	270	179	296	188	683	382	629	912	244	132	208	372
17	260	177	269	181	1220	382	597	615	222	133	149	593
18	250	195	298	177	1660	368	619	502	207	134	145	424
19	240	187	270	177	1560	352	496	441	224	122	139	319
20	230	185	240	180	1440	340	451	421	213	185	139	281
21	260	199	256	168	1090	339	413	410	190	182	132	286
22	300	205	242	167	951	340	389	393	469	143	134	931
23	250	201	262	201	1440	324	1370	370	347	123	126	457
24	246	213	270	202	1390	326	859	343	255	122	122	353
25	376	240	248	203	1020	304	609	405	234	121	128	327
26	269	220	236	290	839	430	518	350	197	142	128	331
27	242	257	220	281	750	515	477	441	176	136	126	343
28	277	320	224	231	767	368	565	400	156	1150	190	312
29	261	264	241	209	---	355	740	285	146	740	420	296
30	263	239	248	193	---	407	534	305	151	250	583	419
31	218	---	237	177	---	417	---	247	---	205	239	---
TOTAL	8582	6344	10323	6248	19220	13344	16796	14752	7098	6791	6247	13709
MEAN	277	211	333	202	686	430	560	476	237	219	202	457
MAX	400	320	756	290	1660	700	1370	1150	469	1150	583	1040
MIN	218	177	220	167	196	304	284	247	146	121	122	281
CFSM	.62	.48	.75	.46	1.55	.97	1.26	1.07	.53	.49	.46	1.03
IN.	.72	.53	.86	.52	1.61	1.12	1.41	1.24	.59	.57	.52	1.15

CAL YR 1980 TOTAL 150059 MEAN 410 MAX 2990 MIN 149 CFSM .92 IN 12.57
WTR YR 1981 TOTAL 129454 MEAN 355 MAX 1660 MIN 121 CFSM .80 IN 10.85

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE¼ SE¼ sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on State Highway 53, and 1.4 mi (2.3 km) north of Romeo.

DRAINAGE AREA.--21.8 mi² (56.5 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft (238 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Feb. 6 to Mar. 9, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 15.2 ft³/s (0.430 m³/s), 9.47 in/yr (241 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft³/s (10.1 m³/s) Feb. 10, 1965, gage height, 4.48 ft (1.366 m); maximum gage height, 4.56 ft (1.390 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft³/s (0.023 m³/s) July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft (0.216 m) July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 24	unknown	100	2.83	unknown		Sept. 4	0700	*117	3.31	*2.66	0.811

Minimum discharge, 2.2 ft³/s (0.062 m³/s) Aug. 24, 25, 26, gage height, 0.94 ft (0.287 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.3	8.0	11	7.0	8.2	40	19	22	11	9.9	3.5	9.7
2	9.5	7.9	14	7.0	9.4	35	17	21	9.5	8.6	3.2	15
3	9.6	7.6	16	7.0	9.0	30	17	19	9.6	5.7	3.1	14
4	12	7.6	13	7.0	8.4	28	17	18	9.4	10	3.1	88
5	10	8.1	12	7.0	8.2	26	16	17	8.7	9.9	2.9	46
6	8.7	7.7	12	7.0	8.2	25	15	15	7.8	6.4	2.7	32
7	8.3	7.8	15	7.0	8.2	24	14	14	6.8	5.3	4.1	28
8	7.8	9.5	18	7.0	8.2	23	13	13	7.1	4.8	4.6	26
9	7.1	9.4	19	7.0	9.0	22	15	11	8.1	4.6	4.2	23
10	6.7	9.0	17	7.0	10	21	14	22	7.4	4.4	3.4	18
11	6.8	8.5	15	7.2	15	21	20	50	6.2	3.6	3.1	17
12	6.8	8.1	14	7.2	13	20	22	42	5.2	3.3	2.8	15
13	6.1	8.5	13	7.2	11	21	21	34	5.4	5.4	2.7	13
14	5.0	8.7	12	7.2	11	19	34	35	20	5.0	2.7	12
15	6.8	8.5	12	7.2	13	18	30	36	33	3.8	4.2	11
16	6.0	8.5	11	7.4	18	18	27	35	17	3.7	3.9	11
17	9.1	8.1	10	7.4	23	17	26	30	12	3.4	3.1	19
18	9.1	8.1	10	7.4	30	16	25	27	9.9	5.6	2.7	18
19	8.5	8.0	9.5	7.6	50	16	23	24	8.3	4.2	2.6	16
20	8.8	6.3	9.0	7.8	70	16	21	22	7.4	3.8	2.5	14
21	9.4	6.6	8.5	8.0	75	15	20	20	5.3	3.6	2.4	14
22	12	6.8	8.3	8.0	75	15	20	18	15	3.3	2.4	34
23	9.5	7.5	8.0	8.0	80	15	29	17	12	2.9	2.3	23
24	8.7	8.2	8.0	8.0	90	13	25	16	8.9	2.7	2.3	19
25	9.7	8.5	7.8	8.0	75	14	23	16	7.7	2.6	2.2	17
26	8.8	8.5	7.6	7.8	60	17	22	14	6.1	2.8	2.2	17
27	8.2	8.0	7.6	7.8	50	20	21	17	5.2	2.9	2.3	18
28	8.5	8.5	7.4	7.6	45	18	23	16	4.8	11	11	16
29	8.2	9.0	7.2	7.6	---	18	26	15	4.6	10	37	15
30	7.9	9.5	7.1	7.6	---	19	24	14	4.3	5.7	26	16
31	7.7	---	7.0	7.6	---	20	---	12	---	4.2	13	---
TOTAL	258.6	245.0	347.0	229.6	890.8	640	639	682	283.7	163.1	168.2	634.7
MEAN	8.34	8.17	11.2	7.41	31.8	20.6	21.3	22.0	9.46	5.26	5.43	21.2
MAX	12	9.5	19	8.0	90	40	34	50	33	11	37	88
MIN	5.0	6.3	7.0	7.0	8.2	13	13	11	4.3	2.6	2.2	9.7
CFSM	.38	.38	.51	.34	1.46	.95	.98	1.01	.43	.24	.25	.97
IN.	.44	.42	.59	.39	1.52	1.09	1.09	1.16	.48	.28	.29	1.08

CAL YR 1980 TOTAL 5572.9 MEAN 15.2 MAX 119 MIN 2.6 CFSM .70 IN 9.51
WTR YR 1981 TOTAL 5181.7 MEAN 14.2 MAX 90 MIN 2.2 CFSM .65 IN 8.84

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE¼ sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) downstream from bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft (224 m) from topographic map (nearest 5 ft).

REMARKS.--Records poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 6.47 ft³/s (0.183 m³/s), 6.76 in/yr (172 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft³/s (25.8 m³/s) Apr. 19, 1975, gage height, 6.69 ft (2.039 m); no flow Jan. 25 to Feb. 10, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 18	1500	341	9.66	4.36	1.329	Sept. 4	unknown	105	2.97	unknown	
Feb. 23	0700	*356	10.1	*4.44	1.353						

Minimum daily discharge, 0.06 ft³/s (0.002 m³/s) on many days in July and August.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.72	.62	.77	.46	.46	26	4.4	5.7	1.0	.14	.07	.15
2	1.9	.63	2.1	.46	.46	17	3.6	4.2	.83	.13	.06	.70
3	1.5	.59	1.6	.45	.46	10	3.0	3.2	.87	.10	.06	40
4	1.2	.59	1.2	.45	.46	7.7	2.5	2.7	.89	.14	.06	60
5	1.0	.54	1.1	.45	.46	6.4	2.2	2.4	.78	.12	.06	25
6	.90	.48	1.2	.45	.46	5.4	1.9	2.2	.56	.09	.06	15
7	.80	.75	3.4	.45	.46	4.7	1.6	1.8	.47	.08	.09	9.0
8	.70	.55	8.4	.45	.46	4.5	1.5	1.6	.48	.07	.17	4.5
9	.62	.67	10	.45	.46	4.5	1.6	1.6	.47	.07	.13	2.5
10	.56	.55	5.7	.45	.46	5.7	1.6	4.3	.42	.07	.10	1.8
11	.53	.52	3.8	.45	.60	6.9	2.6	61	.35	.06	.08	1.2
12	.50	.42	2.8	.45	.90	5.9	3.5	47	.31	.06	.07	.90
13	.50	.41	2.3	.45	.75	6.3	3.5	20	.27	.10	.07	.75
14	.50	.44	1.8	.45	.70	4.5	21	11	2.0	.06	.08	.65
15	.90	.43	1.5	.45	.80	4.1	19	17	2.0	.06	.12	.60
16	.80	.39	1.2	.45	5.0	3.7	8.4	26	1.3	.06	.10	1.0
17	.75	.39	.45	.45	40	3.2	6.1	13	1.1	.13	.08	1.6
18	.75	.39	.80	.45	275	2.8	6.5	6.8	.94	.11	.07	1.7
19	.68	.39	.70	.45	228	2.6	5.1	4.9	.72	.07	.06	1.8
20	.55	.39	.60	.45	149	2.4	4.1	3.9	.55	.10	.06	1.6
21	.89	.42	.56	.45	105	2.2	3.1	3.1	.44	.14	.06	23
22	.68	.47	.53	.45	67	2.1	3.1	2.6	1.3	.10	.06	20
23	.68	.36	.50	.45	245	2.1	11	2.2	.85	.07	.06	12
24	.67	.42	.47	.45	112	2.1	11	2.0	.72	.11	.06	6.0
25	.83	.39	.45	.45	56	2.1	7.1	1.9	.48	.08	.06	3.5
26	.80	.45	.42	.45	37	3.0	4.9	1.5	.34	.08	.06	2.0
27	.76	.45	.40	.45	21	6.6	3.9	1.7	.24	.15	.07	.80
28	.71	.69	.38	.45	21	4.8	11	2.0	.21	.30	.10	.60
29	.69	.76	.40	.45	---	4.4	17	1.6	.17	.20	.20	.50
30	.62	.79	.45	.45	---	4.4	9.0	1.4	.14	.10	.15	.45
31	.62	---	.47	.45	---	5.1	---	1.5	---	.08	.12	---
TOTAL	24.31	15.34	56.45	13.97	1369.35	173.2	184.8	261.8	21.20	3.23	2.65	239.30
MEAN	.78	.51	1.82	.45	48.9	5.59	6.16	8.45	.71	.10	.085	7.98
MAX	1.9	.79	10	.46	275	26	21	61	2.0	.30	.20	60
MIN	.50	.36	.38	.45	.46	2.1	1.5	1.4	.14	.06	.06	.15
CFSM	.06	.04	.14	.04	3.76	.43	.47	.65	.06	.008	.007	.61
IN.	.07	.04	.16	.04	3.92	.50	.53	.75	.06	.01	.01	.68

CAL YR 1980 TOTAL 1897.23 MEAN 5.18 MAX 256 MIN .09 CFSM .40 IN 5.43
WTR YR 1981 TOTAL 2365.60 MEAN 6.48 MAX 275 MIN .06 CFSM .50 IN 6.77

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW¼ sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft (9 m) upstream from bridge on State Highway 59, 2 mi (3 km) north of Mount Clemens, and 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--199 mi^2 (515 km^2).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft (175.681 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at times by mill above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--34 years, 119 ft^3/s (3.370 m^3/s), 8.12 in/yr (206 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft^3/s (190 m^3/s) Feb. 2, 1968, gage height, 18.62 ft (5.675 m); minimum, 0.2 ft^3/s (0.006 m^3/s) Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft (0.951 m) Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft (6.10 m), from floodmark.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s (34.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 20	0200	*2770	78.4	*14.41	4.392	Feb. 24	1100	2240	63.4	13.75	4.191

Minimum discharge, 3.8 ft^3/s (0.108 m^3/s) Aug. 26, gage height, 4.02 ft (1.225 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	29	33	25	24	343	127	218	50	14	18	42
2	29	28	44	25	25	334	106	139	45	21	14	59
3	41	26	112	25	26	252	90	111	41	22	12	59
4	47	25	93	25	28	185	81	96	39	18	10	175
5	53	25	70	24	29	158	77	88	39	139	9.3	392
6	49	25	55	24	28	140	75	81	36	76	8.4	485
7	40	25	81	24	28	122	67	75	31	36	9.3	393
8	36	25	218	24	28	114	60	68	29	25	25	164
9	32	29	367	24	28	110	59	63	29	19	30	110
10	29	30	353	24	28	115	64	66	30	16	24	84
11	27	29	192	23	35	125	75	257	28	14	22	64
12	25	26	109	23	50	123	122	583	25	13	17	53
13	25	24	93	23	40	115	177	692	23	14	13	44
14	24	23	89	23	40	110	249	415	25	17	11	37
15	24	23	77	23	45	98	428	270	77	15	14	33
16	33	23	62	23	110	93	370	444	116	14	22	32
17	40	22	46	23	409	90	206	392	67	10	18	36
18	41	21	44	23	959	84	159	213	45	9.8	14	67
19	44	21	42	23	2340	77	133	141	35	15	11	90
20	40	20	33	23	2580	72	112	118	29	15	8.8	76
21	36	19	29	23	1780	71	97	102	25	14	7.6	62
22	36	18	26	23	1090	68	88	92	26	14	6.8	162
23	38	18	25	23	1060	68	193	80	44	14	6.0	366
24	37	19	27	23	2040	68	382	72	44	10	5.3	301
25	35	19	26	23	1230	68	257	68	33	8.8	4.7	142
26	36	19	25	24	740	72	158	67	27	8.4	4.7	97
27	39	20	26	25	500	136	123	63	22	8.4	5.3	83
28	37	24	25	25	352	168	146	72	19	14	6.8	72
29	34	29	25	25	---	128	314	74	17	47	13	64
30	31	34	25	24	---	118	350	64	15	42	72	62
31	29	---	25	23	---	131	---	57	---	26	63	---
TOTAL	1095	718	2497	735	15672	3956	4945	5341	1111	729.4	506.0	3906
MEAN	35.3	23.9	80.5	23.7	560	128	165	172	37.0	23.5	16.3	130
MAX	53	34	367	25	2580	343	428	692	116	139	72	485
MIN	24	18	25	23	24	68	59	57	15	8.4	4.7	32
CFSM	.18	.12	.41	.12	2.81	.64	.83	.86	.19	.12	.08	.65
IN.	.20	.13	.47	.14	2.93	.74	.92	1.00	.21	.14	.09	.73

CAL YR 1980 TOTAL 42956.0 MEAN 117 MAX 1920 MIN 13 CFSM .59 IN 8.03
WTR YR 1981 TOTAL 41211.4 MEAN 113 MAX 2580 MIN 4.7 CFSM .57 IN 7.70

04164800 MIDDLE BRANCH CLINTON RIVER AT MACOMB, MI

LOCATION.--Lat 42°42'23", long 82°57'33", in SW¼ sec.5, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Romeo Plank Road, 0.4 mi (0.6 km) north of Macomb.

DRAINAGE AREA.--41.0 mi² (106.2 km²).

PERIOD OF RECORD.--Water years 1959-62, 1969 (annual maximum and occasional low-flow measurements), October 1962 to September 1968, October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 603.23 ft (183.865 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Oct. 28, 1958, to Nov. 14, 1962, and Oct. 12, 1968, to Dec. 17, 1969, crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 27.2 ft³/s (0.770 m³/s), 9.01 in/yr (229 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) June 26, 1968; maximum gage height, 16.16 ft (4.926 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.10 ft³/s (0.003 m³/s) July 22, 1971; minimum gage height, 4.68 ft (1.426 m) July 11, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 17	2100	*973	27.6	*12.78	3.895	Feb. 23	0800	537	15.2	9.80	2.987

Minimum discharge, 0.93 ft³/s (0.026 m³/s) Aug. 24, 25, 27; minimum gage height, 4.98 ft (1.518 m) July 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.5	12	19	8.8	7.9	65	24	40	11	6.3	3.3	7.7
2	17	11	57	8.8	7.9	51	20	30	9.7	4.7	2.5	13
3	13	10	43	8.7	7.9	41	19	24	10	3.5	3.0	10
4	16	9.6	33	8.7	7.9	38	20	21	9.9	9.7	2.9	56
5	13	9.6	22	8.6	7.9	38	19	19	8.4	9.1	2.4	16
6	12	9.2	25	8.5	7.9	33	18	18	7.7	4.7	2.0	11
7	11	9.2	52	8.4	7.9	30	19	16	6.6	3.4	23	9.2
8	11	17	92	8.3	7.9	28	17	15	10	2.9	9.4	8.0
9	9.5	13	85	8.2	7.9	33	21	14	10	2.7	7.1	7.1
10	9.0	11	47	8.0	9.0	33	19	30	8.4	3.4	4.4	5.8
11	9.3	9.7	33	7.8	16	31	42	187	6.9	2.4	4.3	5.3
12	9.4	8.7	27	7.6	14	24	74	86	6.0	2.2	3.4	4.5
13	8.5	8.7	24	7.4	13	24	61	49	7.4	7.8	2.8	3.7
14	8.4	10	22	7.3	13	21	159	39	14	4.0	2.7	3.5
15	15	10	20	7.2	15	21	77	97	13	2.7	11	3.4
16	13	9.9	18	7.2	80	21	46	100	8.3	3.0	5.4	16
17	13	9.6	16	7.2	600	20	41	51	7.3	2.7	3.4	23
18	12	9.6	14	7.2	836	19	35	36	6.1	3.2	2.7	19
19	11	9.2	12	7.2	668	20	28	28	4.9	2.3	2.3	11
20	10	10	11	7.2	433	17	24	23	4.6	2.6	2.0	9.2
21	14	9.6	10	7.2	171	17	21	20	4.0	2.6	1.7	8.7
22	12	9.6	10	7.2	142	17	20	16	16	2.2	1.5	59
23	10	9.0	9.8	7.2	377	18	141	15	8.3	1.7	1.5	19
24	10	9.5	9.6	7.2	195	18	71	16	6.3	1.6	1.2	12
25	19	10	9.4	7.2	108	18	46	20	6.3	1.4	1.2	9.6
26	16	10	9.2	7.5	81	39	35	16	4.9	1.5	1.1	9.5
27	13	10	9.0	8.0	63	51	30	21	4.2	2.0	1.1	9.3
28	12	23	9.0	8.0	76	33	75	22	3.5	27	3.3	7.4
29	12	22	8.9	8.0	---	30	87	17	3.7	10	7.7	7.0
30	11	20	8.8	8.0	---	29	56	15	3.4	5.4	16	18
31	13	---	8.8	8.0	---	27	---	13	---	3.9	5.4	---
TOTAL	371.6	339.7	774.5	241.8	3981.1	905	1365	1114	230.8	142.6	141.7	401.9
MEAN	12.0	11.3	25.0	7.80	142	29.2	45.5	35.9	7.69	4.60	4.57	13.4
MAX	19	23	92	8.8	836	65	159	187	16	27	23	59
MIN	8.4	8.7	8.8	7.2	7.9	17	17	13	3.4	1.4	1.1	3.4
CFSM	.29	.28	.61	.19	3.46	.71	1.11	.88	.19	.11	.11	.33
IN.	.34	.31	.70	.22	3.61	.82	1.24	1.01	.21	.13	.13	.36

CAL YR 1980 TOTAL 11001.7 MEAN 30.1 MAX 614 MIN 2.5 CFSM .73 IN 9.98
WTR YR 1981 TOTAL 10009.7 MEAN 27.4 MAX 836 MIN 1.1 CFSM .67 IN 9.08

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank 20 ft (6 m) downstream from bridge on Moravian Drive, 0.2 mi (0.3 km) downstream from North Branch, and 0.5 mi (0.8 km) west of Mount Clemens.

DRAINAGE AREA.--734 mi² (1,901 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi (3.2 km) downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi (2.6 km) downstream from base gage at same datum.

REMARKS.--Water-discharge records fair. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--47 years, 525 ft³/s (14.87 m³/s), 9.71 in/yr (247 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft³/s (600 m³/s) Apr. 6, 1947, gage height, 23.55 ft (7.178 m), from floodmark; minimum not determined; minimum gage height, 2.72 ft (0.829 m) Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft³/s (85.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 20	0600	*4180	118	*10.76	3.280	Feb. 24	1100	3910	111	10.44	3.182

Minimum daily discharge, 130 ft³/s (3.68 m³/s) Aug. 24; minimum gage height, 4.58 ft (1.396 m) Jan. 5.

DISCHARGE. IN CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	280	310	300	280	286	1240	566	779	300	180	210	430
2	545	290	660	270	450	1130	571	665	290	180	180	659
3	375	260	620	250	300	992	509	593	300	170	170	400
4	450	258	450	250	290	857	491	521	310	300	170	1300
5	441	240	400	250	250	826	430	508	290	600	160	1300
6	416	235	340	250	270	769	454	497	270	300	150	1150
7	391	231	819	250	270	695	435	471	230	210	340	1000
8	346	300	1220	250	260	635	380	421	400	190	551	800
9	345	232	1250	250	250	639	440	369	440	220	300	650
10	327	240	900	250	250	686	446	545	300	270	220	600
11	311	250	700	240	700	695	838	1700	230	180	200	550
12	328	240	540	240	560	671	1090	1610	210	150	190	520
13	311	230	500	240	400	654	981	1360	300	170	170	470
14	336	280	446	230	400	606	1910	1030	360	190	180	450
15	340	250	417	230	450	565	1630	1240	380	160	520	410
16	333	230	378	230	781	560	1140	1590	390	150	300	450
17	330	230	350	220	2360	558	920	1100	300	150	200	700
18	320	240	380	220	3230	527	902	778	280	150	170	580
19	316	235	330	220	3860	478	701	629	270	150	165	450
20	304	230	310	220	4040	455	621	600	260	210	165	400
21	308	240	310	210	3290	476	586	570	230	200	150	380
22	391	250	300	240	2620	464	533	540	540	170	150	1200
23	320	240	310	250	3170	449	1770	500	450	150	140	950
24	320	260	320	250	3760	450	1480	460	350	140	130	740
25	490	280	320	250	2790	437	1010	530	300	140	140	550
26	350	260	300	240	1860	574	782	470	250	160	140	470
27	320	310	270	330	1440	829	677	560	210	150	140	450
28	360	380	270	290	1320	658	803	540	190	1300	200	420
29	340	340	290	260	---	589	1230	400	170	900	450	390
30	330	320	300	240	---	624	1000	410	180	350	700	500
31	280	---	290	220	---	688	---	350	---	260	320	---
TOTAL	10954	7891	14640	7620	39907	20476	25326	22336	8980	8200	7371	19319
MEAN	353	263	472	246	1425	661	844	721	299	265	238	644
MAX	545	380	1250	330	4040	1240	1910	1700	540	1300	700	1300
MIN	280	230	270	210	250	437	380	350	170	140	130	380
CFSM	.48	.36	.64	.34	1.94	.90	1.15	.98	.41	.36	.32	.88
IN.	.56	.40	.74	.39	2.02	1.04	1.28	1.13	.46	.42	.37	.98

CAL YR 1980 TOTAL 217271 MEAN 594 MAX 4450 MIN 185 CFSM .81 IN 11.01
WTR YR 1981 TOTAL 193020 MEAN 529 MAX 4040 MIN 130 CFSM .72 IN 9.78

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981 (discontinued).
WATER TEMPERATURES: October 1974 to September 1981 (discontinued).

INSTRUMENTATION.--Water-quality monitor since Aug. 13, 1975.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 3,580 micromhos Jan. 26, 1978; minimum recorded (water years 1975-76, 1978-81), 126 micromhos, July 29, 1976.
WATER TEMPERATURES: Maximum, 29.5°C Sept. 20, 1978; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 3,160 micromhos Feb. 2; minimum, 304 micromhos Feb. 19.
WATER TEMPERATURES: Maximum, 27.0°C July 9; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 09...	1030	347	772	8.2	12.5	7.1	67	K1100	270	240	47	62
NOV 19...	1015	234	835	8.1	3.0	12.4	--	K910	96	230	41	61
DEC 17...	1000	--	838	7.7	.0	14.0	97	320	130	260	53	69
JAN 22...	1130	239	998	8.0	1.0	12.8	93	K1100	100	260	74	71
FEB 24...	1030	3890	534	7.9	3.0	12.4	94	--	8400	190	68	52
MAR 25...	1100	402	836	8.2	6.0	13.0	104	230	K100	270	65	74
APR 22...	1200	519	686	8.4	10.5	11.3	103	200	E35	300	79	80
MAY 21...	1045	569	814	8.2	15.5	8.4	86	570	58	280	50	75
JUN 17...	1230	403	766	8.0	21.0	6.4	72	E590	720	260	63	70
JUL 15...	1530	151	775	8.1	23.0	7.4	86	590	230	240	68	65
AUG 20...	1130	172	785	--	20.0	7.4	81	K720	--	240	--	65
SEP 24...	1015	741	627	8.2	13.0	9.3	85	E5600	>2000	--	--	--

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 09...	20	55	33	1.6	4.8	3.6	240	0	197	2.3	61
NOV 19...	19	53	33	1.5	5.4	4.0	240	0	197	2.9	56
DEC 17...	22	54	30	1.5	4.8	3.6	280	0	230	8.2	59
JAN 22...	21	100	45	2.7	5.0	3.7	250	0	205	3.7	61
FEB 24...	14	28	24	.9	4.5	3.4	170	0	139	2.9	36
MAR 25...	21	53	29	1.4	4.0	3.0	250	0	205	2.5	57
APR 22...	24	48	26	1.2	3.8	2.8	270	4	221	1.6	59
MAY 21...	22	50	28	1.3	3.8	2.8	280	0	230	2.8	53
JUN 17...	21	57	32	1.5	4.8	3.6	240	0	197	3.5	52
JUL 15...	19	59	34	1.7	5.5	4.1	210	0	172	2.7	40
AUG 20...	20	69	37	1.9	6.4	4.8	--	--	--	--	54
SEP 24...	--	--	--	--	--	--	220	0	180	--	--

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT 09...	83	.5	4.7	450	417	422	2.6	2.6	--	.070	.09
NOV 19...	83	.5	3.8	453	419	286	4.4	4.3	--	.160	.21
DEC 17...	93	.4	6.1	485	454	--	5.0	4.3	.140	.140	.18
JAN 22...	168	.5	7.2	607	576	392	4.3	4.3	.310	.310	.40
FEB 24...	58	.2	5.3	328	279	3450	2.0	2.0	.120	.080	.10
MAR 25...	92	.4	4.2	448	437	486	2.6	2.6	.100	.100	.13
APR 22...	90	.3	2.5	614	444	860	2.2	2.2	.140	.130	.17
MAY 21...	84	.3	3.3	467	433	717	2.3	2.2	.120	.120	.15
JUN 17...	90	.5	6.9	449	423	489	2.9	2.9	.140	.120	.15
JUL 15...	98	.6	6.1	482	411	197	3.4	3.4	.010	.020	.03
AUG 20...	130	.6	4.9	507	--	235	4.2	4.2	.120	.100	.13
SEP 24...	--	--	--	--	--	--	--	--	--	--	--

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 09...	--	.66	3.3	14	.110	.34	.100	4.9	17	16	100
NOV 19...	--	.56	5.0	22	.210	.64	.180	--	3	1.9	100
DEC 17...	.44	.58	5.6	25	.090	.28	.050	6.8	60	--	100
JAN 22...	.52	.83	5.1	23	.140	.43	.110	4.8	6	3.9	100
FEB 24...	.82	.94	2.9	13	.180	.55	.070	8.9	88	924	100
MAR 25...	.51	.61	3.2	14	.090	.28	.060	6.2	8	8.7	100
APR 22...	.72	.86	3.1	14	.130	.40	.080	--	19	27	100
MAY 21...	1.1	1.20	3.5	16	.160	.49	.040	7.1	31	48	100
JUN 17...	.71	.85	3.8	17	.240	.74	.140	8.2	39	42	100
JUL 15...	1.1	1.10	4.5	20	.190	.58	.120	6.5	16	6.5	100
AUG 20...	.60	.72	4.9	22	.210	.64	.160	6.2	19	8.8	100
SEP 24...	--	--	--	--	--	--	--	--	46	92	--

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT											
09...	1030	3	2	100	60	3	3	10	<10	0	0
JAN											
22...	1130	1	1	100	60	1	1	20	10	1	1
APR											
22...	1200	2	1	200	50	2	2	10	<10	1	1
JUL											
15...	1530	3	2	100	60	1	<1	10	10	3	2

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT										
09...	6	6	750	10	8	2	40	20	.2	.2
JAN										
22...	8	3	390	<10	7	2	90	70	.2	.2
APR										
22...	12	4	710	10	14	0	80	50	<.1	<.1
JUL										
15...	7	3	510	<10	12	1	70	40	<.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT										
09...	7	5	0	0	0	0	30	9	4.5	.4
JAN										
22...	16	13	0	0	0	0	50	20	4.5	.3
APR										
22...	11	5	0	0	0	0	40	<4	5.8	--
JUL										
15...	29	16	0	0	0	0	60	<4	5.7	.8

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 19,80	MAR 25,81	MAY 21,81	JUN 17,81
TIME	1015	1100	1045	1230
TOTAL CELLS/ML	1100	640	8300	1800
DIVERSITY: DIVISION	1.3	1.2	1.7	1.5
.CLASS	1.3	1.2	1.7	1.5
..ORDER	1.8	2.0	2.3	2.0
...FAMILY	2.3	2.6	3.1	2.6
....GENUS	2.4	2.7	3.4	3.1

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	--	-	--	-	--	-	13	1
....TETRAEDRON	--	-	--	-	*	0	--	-
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	26	1
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	13	1	--	-	220	3	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	26	2	77	12	310	4	64	4
....KIRCHNERIELLA	--	-	--	-	140	2	--	-
....OOCYSTIS	--	-	--	-	--	-	13	1
....SELENASTRUM	--	-	13	2	--	-	52	3
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	560	7	570#	32
....SCENEDESMUS	26	2	--	-	1300#	16	150	9
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	140#	22	250	3	120	7
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	39	3	--	-	1300#	15	130	7
....MELOSIRA	26	2	--	-	--	-	13	1
....STEPHANODISCUS	--	-	100#	16	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	56	1	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	13	2	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	13	2	200	2	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	190#	17	--	-	84	1	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	13	1	26	4	--	-	13	1
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	140	2	--	-
...NAVICULACEAE								
....NAVICULA	13	1	210#	32	450	5	64	4
...NITZSCHIACEAE								
....NITZSCHIA	100	9	13	2	450	5	77	4
...SURIRELLACEAE								
....SURIRELLA	26	2	13	2	84	1	13	1
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE								
..MISCHOCOCCALES								
...SCIADACEAE								
....OPHIOCYTIUM	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	140	2	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	13	1	--	-	84	1	13	1

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 19,80		MAR 25,81		MAY 21,81		JUN 17,81	
TIME	1015		1100		1045		1230	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	64	6	--	-	200	2	400#	23
..NOSTOCALES								
...HAMMATOIDEACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	590#	52	--	-	2400#	28	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	13	1
....PHACUS	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	26	4	--	-	13	1

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 15,81	AUG 20,81	SEP 24,81
TIME	1530	1130	1015
TOTAL CELLS/ML	6500	5100	5500
DIVERSITY: DIVISION	1.1	1.8	1.4
.CLASS	1.1	1.8	1.4
..ORDER	1.6	2.6	2.1
...FAMILY	1.8	3.3	2.8
....GENUS	1.9	3.8	3.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHLOROCOCCACEAE						
....SCHROEDERIA	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	*	0
...COCCOMYXACEAE						
....ELAKATOTHRIX	--	-	--	-	*	0
...DICTYOSPHAERIACEAE						
....DICTYOSPHAERIUM	250	4	--	-	55	1
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	--	-	380	7
...MICRACTINIACEAE						
....MICRACTINIUM	--	-	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	100	2	140	3	41	1
....KIRCHNERIELLA	--	-	*	0	--	-
....OOCYSTIS	--	-	*	0	--	-
....SELENASTRUM	50	1	--	-	--	-
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	--	-	55	1
...SCENEDESMACEAE						
....COELASTRUM	--	-	--	-	55	1
....CRUCIGENIA	--	-	560	11	110	2
....SCENEDESMUS	700	11	840#	17	370	7
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	550	9	260	5	55	1
...PHACOTACEAE						
....PHACOTUS	--	-	--	-	*	0
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	4200#	64	420	8	110	2
....MELOSIRA	50	1	93	2	69	1
....STEPHANODISCUS	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	--	-	160	3	--	-
....COCCONEIS	--	-	--	-	*	0
....RHOICOSPHENIA	--	-	120	2	41	1
...DIATOMACEAE						
....DIATOMA	--	-	*	0	*	0
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	110	2
....SYNEDRA	--	-	160	3	*	0
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	47	1	--	-
...NAVICULACEAE						
....NAVICULA	50	1	350	7	220	4
...NITZSCHIACEAE						
....NITZSCHIA	350	5	490	10	300	5
...SURIRELLACEAE						
....SURIRELLA	--	-	--	-	--	-
.CHRYSOPHYCEAE						
..OCHROMONADALES						
...OCHROMONADACEAE						
....OCHROMONAS	--	-	70	1	--	-
.XANTHOPHYCEAE						
..MISCHOCOCCALES						
...SCIADACEAE						
....OPHIOCYTIUM	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	93	2	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	50	1	70	1	*	0

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 15,81		AUG 20,81		SEP 24,81	
TIME	1530		1130		1015	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	50	1	560	11	--	-
..NOSTOCALES						
...HAMMATOIDEACEAE						
....RAPHIDIOPSIS	--	-	--	-	260	5
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	120	2
....APHANIZOMENON	--	-	--	-	320	6
..OSCILLATORIALES						
...OSCILLATORIACEAE						
....LYNGBYA	--	-	470	9	320	6
....OSCILLATORIA	--	-	47	1	2400#	43
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	100	2	--	-	--	-
....PHACUS	--	-	*	0	--	-
....TRACHELOMONAS	--	-	*	0	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	731	725	728	840	829	833	911	902	906	1600	1150	1330
2	770	732	753	843	839	841	968	863	903	1350	1150	1270
3	747	739	742	846	835	841	878	858	870	1320	1190	1240
4	752	746	748	839	834	836	877	872	876	1290	1140	1200
5	759	753	756	840	833	837	876	874	875	1230	1110	1170
6	773	764	767	845	838	841	875	865	871	1110	989	1070
7	775	769	773	846	844	845	865	777	829	1080	984	1030
8	782	774	777	928	845	861	876	796	825	1230	1050	1170
9	781	775	781	895	846	863	848	834	841	1330	1130	1220
10	820	813	817	851	843	847	855	847	850	1240	1070	1140
11	821	816	818	871	844	854	869	857	864	1150	1030	1080
12	826	817	820	886	861	872	869	821	853	1070	1020	1040
13	830	823	826	897	878	888	868	842	858	1040	967	999
14	837	831	834	893	885	889	965	855	905	1010	968	985
15	835	816	825	894	891	892	956	945	952	1050	980	1010
16	826	788	808	897	890	894	950	927	940	1090	994	1050
17	811	797	801	901	891	896	944	936	939	1140	1060	1090
18	841	805	827	892	870	883	942	934	939	1210	1040	1090
19	831	820	824	911	890	897	979	935	958	1190	1040	1110
20	828	823	824	910	907	909	988	964	975	1600	1100	1300
21	835	820	828	910	901	907	996	969	985	1560	1230	1360
22	869	839	863	928	909	915	1010	994	998	1250	1070	1160
23	870	857	862	917	905	908	1010	992	1000	1210	1070	1140
24	871	855	861	904	898	901	987	927	964	1340	1160	1230
25	872	831	854	901	886	893	941	919	930	1340	1090	1180
26	832	823	825	900	897	898	948	934	942	1640	1100	1290
27	833	824	828	934	884	901	959	946	952	1550	1260	1360
28	836	827	834	893	887	891	967	957	963	1310	1140	1230
29	841	837	839	889	886	888	969	962	967	1420	1190	1240
30	847	838	843	922	888	901	970	967	968	1580	1350	1420
31	843	828	835	---	---	---	972	969	969	1530	1160	1320
MONTH	872	725	810	934	829	877	1010	777	918	1640	967	1180

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1270	1000	1130	600	579	585	822	802	812	1030	1010	1030
2	3160	1260	1950	600	585	590	812	783	797	1030	1020	1030
3	1730	1350	1570	631	608	616	843	780	799	1020	1010	1010
4	1740	1280	1530	652	637	642	814	784	797	1020	1010	1020
5	1420	1170	1280	670	659	664	821	802	813	1060	1020	1040
6	1260	1110	1180	678	673	676	828	779	799	1050	1040	1050
7	1260	1120	1180	697	676	687	799	757	779	1040	1030	1040
8	1800	1270	1570	717	702	709	794	757	775	1040	1030	1030
9	1950	1350	1560	722	710	717	832	771	791	1050	1020	1030
10	1490	1170	1320	727	706	716	801	755	776	1080	1050	1070
11	3110	1160	1740	729	713	721	773	638	701	1090	1040	1060
12	1710	1320	1530	737	728	734	709	648	687	1060	1010	1040
13	1330	1180	1260	747	739	743	743	695	726	999	845	898
14	1580	1250	1350	754	742	747	726	507	598	876	842	855
15	2050	1560	1800	761	755	758	626	542	584	885	869	877
16	2060	891	1580	766	749	756	688	625	656	866	824	843
17	847	530	681	770	758	764	753	687	725	824	799	811
18	522	329	409	791	775	781	785	745	765	809	799	803
19	328	304	315	801	796	798	833	786	811	798	792	795
20	338	305	319	821	809	817	861	828	848	806	788	796
21	390	341	363	833	828	831	859	843	849	838	795	813
22	452	395	425	840	829	836	865	818	830	810	798	805
23	480	455	470	845	838	843	871	766	818	821	798	808
24	475	354	438	855	846	851	905	851	883	827	798	812
25	420	362	387	866	851	860	967	903	937	818	773	797
26	488	434	462	1180	864	928	994	960	979	810	790	802
27	536	497	517	1070	862	913	1010	987	999	935	784	822
28	588	542	569	865	823	842	1040	1000	1020	918	770	803
29	---	---	---	845	817	827	1030	1020	1020	842	787	824
30	---	---	---	919	774	838	1020	1010	1020	871	833	848
31	---	---	---	898	830	864	---	---	---	881	862	869
MONTH	3160	304	1030	1180	579	763	1040	507	813	1090	770	907

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	875	855	863	874	833	862	838	789	807	645	362	590
2	908	868	888	887	827	855	865	843	853	585	369	490
3	945	905	927	825	797	809	873	840	859	604	593	599
4	965	948	959	841	818	832	872	830	847	612	448	512
5	980	965	972	816	756	788	860	832	848	441	429	434
6	1000	980	988	749	644	702	868	840	856	---	---	---
7	999	987	996	637	629	632	879	485	802	---	---	---
8	1010	965	991	663	635	646	644	443	562	---	---	---
9	965	935	948	713	670	702	721	612	659	---	---	---
10	962	905	929	763	709	724	749	728	742	---	---	---
11	912	905	910	828	766	801	783	751	767	---	---	---
12	915	894	902	896	831	873	825	788	806	---	---	---
13	897	889	894	911	897	907	863	830	847	---	---	---
14	892	827	860	914	768	813	889	865	878	---	---	---
15	865	738	817	808	782	790	897	615	767	---	---	---
16	770	730	748	857	810	828	662	628	648	---	---	---
17	749	728	734	876	841	863	696	666	681	---	---	---
18	763	749	756	922	862	891	729	701	714	---	---	---
19	759	726	752	937	884	914	751	725	740	---	---	---
20	746	732	741	889	796	856	805	755	783	---	---	---
21	756	740	747	829	760	795	818	798	806	---	---	---
22	761	745	752	837	762	794	815	805	811	---	---	---
23	755	744	748	860	828	839	815	803	808	---	---	---
24	749	744	746	904	859	875	810	805	808	---	---	---
25	767	752	760	917	897	905	805	784	792	---	---	---
26	763	754	759	936	896	919	800	787	793	---	---	---
27	777	759	766	916	851	894	810	800	804	---	---	---
28	789	772	779	850	312	558	824	776	808	---	---	---
29	803	789	796	621	438	521	782	433	674	---	---	---
30	826	806	815	730	631	692	565	462	511	---	---	---
31	---	---	---	798	733	767	576	556	561	---	---	---
MONTH	1010	726	841	937	312	795	897	433	763			

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.0	16.5	17.0	6.5	6.0	6.5	5.0	4.0	4.5	1.0	.0	.5
2	18.0	17.0	17.5	6.5	6.0	6.0	7.5	4.5	5.5	.5	.0	.0
3	17.0	14.0	15.5	8.5	6.5	7.0	4.5	1.0	2.0	.0	.0	.0
4	14.0	12.0	12.5	9.5	8.5	9.0	1.0	.5	1.0	.0	.0	.0
5	11.5	11.0	11.5	9.0	8.0	8.5	2.0	1.0	1.5	.0	.0	.0
6	11.5	11.0	11.0	7.5	6.5	7.0	4.0	2.0	3.0	.0	.0	.0
7	12.5	11.0	11.5	8.5	7.0	8.0	7.0	4.0	5.5	.0	.0	.0
8	13.5	12.0	13.0	9.0	8.0	8.5	8.0	6.0	7.0	.0	.0	.0
9	13.5	13.0	13.0	9.0	8.0	8.5	7.5	5.5	6.0	.0	.0	.0
10	13.0	11.5	12.0	9.0	6.5	7.5	5.0	3.0	4.5	.0	.0	.0
11	12.5	11.5	12.0	6.5	5.0	5.5	2.5	1.0	1.5	.0	.0	.0
12	11.5	10.0	10.5	5.0	3.5	4.5	1.5	.5	1.0	.0	.0	.0
13	10.0	9.0	9.5	5.5	4.5	5.0	2.0	1.5	2.0	.0	.0	.0
14	9.0	8.5	8.5	7.5	5.5	6.5	2.0	.5	1.5	.0	.0	.0
15	10.0	8.5	9.5	7.0	5.5	6.0	1.0	.5	1.0	.0	.0	.0
16	11.0	10.0	10.5	5.5	4.5	5.0	1.5	.5	1.0	.0	.0	.0
17	12.5	11.0	11.5	4.5	3.5	4.0	.5	.0	.5	.0	.0	.0
18	13.0	12.5	12.5	4.0	3.5	4.0	1.5	.5	1.0	.0	.0	.0
19	12.5	10.5	11.5	4.0	3.0	3.5	1.0	.0	.5	.0	.0	.0
20	10.5	9.5	10.0	4.0	2.5	3.5	.5	.0	.0	.5	.0	.5
21	10.5	9.0	9.5	4.0	3.5	4.0	.5	.0	.0	1.0	.5	.5
22	10.0	8.5	9.0	4.5	3.0	3.5	.0	.0	.0	1.0	.0	.5
23	9.0	8.0	8.5	4.5	3.5	4.0	.5	.0	.5	1.0	.5	1.0
24	9.0	8.0	8.5	5.0	4.5	5.0	1.0	.0	.5	1.0	.0	.5
25	11.0	9.0	10.0	5.0	4.0	5.0	.0	.0	.0	1.0	.0	.5
26	9.5	7.0	8.0	4.0	3.0	3.5	.0	.0	.0	2.0	1.0	1.5
27	6.5	6.0	6.5	3.5	2.0	2.5	.0	.0	.0	2.0	1.5	1.5
28	8.0	6.5	7.0	5.0	3.0	4.0	.0	.0	.0	2.0	1.5	2.0
29	7.0	6.0	6.5	3.5	3.0	3.5	.5	.0	.0	1.5	1.0	1.5
30	6.5	5.5	6.0	4.0	3.0	3.5	1.0	.5	1.0	1.0	.0	.5
31	7.0	5.5	6.0	---	---	---	.5	.0	.5	.5	.0	.0
MONTH	18.0	5.5	10.5	9.5	2.0	5.5	8.0	.0	1.5	2.0	.0	.5

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.0	2.5	2.5	2.5	12.5	11.0	12.0	13.0	11.5	12.0
2	2.5	.0	1.0	2.5	2.0	2.0	12.5	10.0	11.5	13.5	11.5	12.5
3	.0	.0	.0	2.0	1.0	1.5	12.5	11.0	12.0	14.5	11.5	13.0
4	.0	.0	.0	2.0	2.0	2.0	13.5	12.5	13.0	16.0	13.0	14.5
5	.0	.0	.0	2.5	2.0	2.0	13.0	8.5	10.5	16.5	15.5	16.0
6	.0	.0	.0	2.0	1.5	2.0	9.5	6.5	8.0	15.0	13.0	14.0
7	.5	.0	.0	2.0	1.5	1.5	11.0	8.0	9.0	15.0	12.0	13.5
8	.0	.0	.0	4.0	1.5	2.5	13.0	10.0	11.5	15.5	13.0	14.0
9	.0	.0	.0	4.5	3.5	4.0	14.5	12.5	13.5	15.0	14.5	14.5
10	.0	.0	.0	4.5	4.5	4.5	14.0	12.0	13.0	15.0	12.0	14.0
11	2.0	.0	.5	4.5	3.5	4.0	14.5	13.0	13.5	12.0	9.0	10.0
12	.0	.0	.0	5.0	2.5	3.5	14.0	11.0	12.5	10.5	8.5	9.5
13	1.0	.0	.0	4.5	4.0	4.5	10.5	9.5	10.0	12.5	10.5	11.0
14	1.5	.0	.5	4.5	2.5	3.5	12.0	9.5	10.5	12.5	11.5	12.5
15	2.5	1.0	1.5	5.5	3.0	4.0	10.5	9.0	10.0	11.5	10.0	10.5
16	2.5	1.0	1.5	5.5	4.0	4.5	11.0	9.0	10.0	12.5	9.5	11.0
17	.5	.0	.0	4.5	3.5	4.0	14.0	11.0	12.0	14.5	12.5	13.5
18	.5	.0	.0	3.5	2.5	3.0	14.5	13.0	13.5	14.0	12.5	13.5
19	.0	.0	.0	2.5	2.0	2.0	13.0	11.5	12.0	14.0	12.0	13.0
20	.0	.0	.0	2.5	1.5	2.0	11.5	10.0	11.0	15.5	13.0	14.0
21	.5	.0	.0	4.0	2.5	3.0	11.0	8.5	9.5	17.0	15.0	16.0
22	1.5	.0	1.0	5.0	2.5	3.5	10.5	9.0	10.0	18.5	16.0	17.5
23	2.0	1.0	1.5	6.0	4.0	5.0	11.5	9.0	10.5	20.0	18.0	19.0
24	2.0	2.0	2.0	6.5	5.0	6.0	11.0	9.5	10.5	20.0	19.0	19.5
25	2.5	1.5	2.0	6.5	5.0	5.5	9.5	8.5	9.0	21.0	19.0	19.5
26	2.5	2.0	2.0	6.5	5.0	5.5	9.5	8.0	9.0	21.0	19.5	20.5
27	2.0	1.5	2.0	7.0	5.0	6.0	12.5	9.0	10.5	20.0	17.0	18.5
28	2.5	1.5	2.0	8.0	5.5	7.0	13.0	12.0	12.5	17.5	16.5	17.0
29	---	---	---	10.0	8.0	8.5	13.0	11.0	12.0	19.0	16.5	17.5
30	---	---	---	11.0	10.0	10.5	12.0	10.5	11.5	19.0	17.5	18.5
31	---	---	---	12.5	10.0	11.5	---	---	---	18.0	15.5	17.0
MONTH	2.5	.0	.5	12.5	1.0	4.0	14.5	6.5	11.0	21.0	8.5	14.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.0	15.5	17.0	22.5	21.0	22.0	23.5	21.0	22.5	22.0	21.0	21.5
2	19.0	16.5	18.0	22.5	21.0	22.0	24.0	22.5	23.5	22.0	20.5	21.0
3	20.0	18.0	19.0	24.0	22.5	23.0	24.5	23.0	24.0	20.0	19.0	19.5
4	21.5	18.5	20.0	24.0	23.0	23.5	25.0	23.0	24.0	19.0	18.0	18.5
5	22.0	19.5	21.0	24.0	22.0	23.0	25.0	23.0	24.0	18.0	17.5	17.5
6	23.0	21.0	22.0	24.5	22.0	23.5	24.0	22.5	23.0	---	---	---
7	22.0	19.5	21.0	26.0	23.5	24.5	23.5	21.5	22.5	---	---	---
8	21.5	20.0	20.5	26.5	25.0	26.0	23.0	21.0	22.0	---	---	---
9	20.5	19.0	20.0	27.0	25.5	26.5	23.0	21.5	22.5	---	---	---
10	21.0	19.0	20.0	26.5	23.5	25.0	23.0	22.5	22.5	---	---	---
11	21.0	19.0	20.0	25.5	23.5	24.5	23.5	22.5	23.0	---	---	---
12	21.0	19.5	20.0	26.0	24.0	25.0	23.5	21.5	22.5	---	---	---
13	20.5	18.5	19.5	26.5	25.0	26.0	24.0	22.5	23.0	---	---	---
14	21.0	18.5	19.0	26.5	24.0	25.0	24.0	23.0	23.5	---	---	---
15	23.5	20.5	22.0	23.0	23.0	23.0	23.5	21.5	22.5	---	---	---
16	23.5	22.0	23.0	23.5	22.5	23.0	22.0	21.0	21.5	---	---	---
17	22.0	20.0	21.0	24.5	22.5	23.0	21.0	19.0	20.0	---	---	---
18	22.0	20.0	21.0	25.5	23.0	24.0	21.0	19.0	20.0	---	---	---
19	22.0	20.5	21.5	25.5	24.5	25.0	21.0	19.0	20.0	---	---	---
20	20.5	18.5	19.5	24.5	23.0	23.5	21.5	18.5	20.0	---	---	---
21	22.0	19.0	20.5	24.0	22.5	23.0	21.5	20.0	21.0	---	---	---
22	22.0	19.5	20.5	23.0	20.5	22.0	21.5	19.5	21.0	---	---	---
23	20.5	18.5	19.5	22.0	19.5	21.0	21.5	20.0	21.0	---	---	---
24	20.5	19.5	20.0	23.0	20.5	22.0	22.0	21.0	21.5	---	---	---
25	22.5	20.5	21.0	24.0	22.0	23.0	21.5	19.5	20.5	---	---	---
26	22.0	19.0	20.5	24.0	23.0	23.5	21.5	19.5	20.5	---	---	---
27	21.0	18.5	20.0	23.0	21.5	22.5	21.0	20.5	21.0	---	---	---
28	21.5	19.0	20.5	23.0	19.0	20.5	21.5	20.0	21.0	---	---	---
29	24.0	21.0	22.0	20.5	18.5	19.5	21.5	21.0	21.5	---	---	---
30	24.0	22.5	23.5	22.5	19.0	20.5	21.5	20.0	21.0	---	---	---
31	---	---	---	23.0	20.0	21.5	21.5	20.5	21.0	---	---	---
MONTH	24.0	15.5	20.5	27.0	18.5	23.0	25.0	18.5	22.0			

04165556 CLINTON RIVER BY-PASS BELOW WEIR AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°34'43", long 82°52'34", in NW¼ sec.23, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 600 ft downstream from weir, on Wellington Crescent in Mount Clemens.

PERIOD OF RECORD.--December 1979 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 6.80 ft (2.073 m) June 7, 1980; minimum recorded, 4.64 ft (1.414 m) Jan. 7, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 6.52 ft (1.987 m) Sept. 30, stage still rising, peak occurred Oct. 1, 1981; maximum peak gage height recorded, 6.49 ft (1.978 m) July 28; minimum gage height recorded, 4.65 ft (1.417 m) Apr. 1.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.87	5.28	5.03			---	4.99	5.63	5.66	5.95	5.99	5.80
2	5.83	5.39	---			---	5.09	5.62	5.64	6.03	5.93	5.78
3	5.75	5.44	5.02			---	5.23	5.68	5.63	6.03	5.92	5.79
4	5.70	5.23	5.30			---	5.25	5.68	5.63	6.01	5.85	5.85
5	5.79	5.24	5.26			---	4.81	5.58	5.64	6.00	5.85	5.89
6	5.81	5.27	5.15			---	4.92	5.31	5.58	5.97	5.88	5.97
7	5.79	5.27	5.14			---	5.16	5.48	5.65	5.97	5.97	6.04
8	5.74	5.31	5.17			---	5.23	5.57	5.67	5.94	5.98	5.86
9	5.76	5.20	5.27			---	5.12	5.59	5.59	5.94	5.96	5.90
10	5.79	5.04	5.07			---	5.21	5.49	5.60	5.95	5.94	5.86
11	5.59	5.16	5.23			---	5.23	5.57	5.64	5.97	5.90	5.87
12	5.48	5.27	5.26			---	5.23	5.67	5.68	5.97	5.87	5.82
13	5.57	5.27	5.10			---	5.28	5.79	5.76	5.93	5.87	5.83
14	5.69	5.20	4.96			---	5.34	5.73	5.77	5.90	5.86	5.82
15	5.69	5.22	5.21			---	5.48	5.66	5.81	5.94	5.90	5.81
16	5.68	5.26	5.12			---	5.58	5.82	5.77	5.95	5.83	5.83
17	5.72	5.27	5.19			---	5.60	5.80	5.77	5.93	5.89	5.90
18	5.57	5.12	---			---	5.55	5.72	5.85	5.93	5.89	5.85
19	5.52	5.16	---			---	5.54	5.75	5.81	5.94	5.89	5.79
20	5.48	5.19	---			---	5.35	5.66	5.85	5.98	5.88	5.76
21	5.44	4.98	---			---	5.49	5.64	5.85	5.92	5.89	5.84
22	5.54	5.08	---			---	5.62	5.63	5.86	5.96	5.87	5.89
23	5.69	5.06	---			---	5.65	5.63	5.95	5.99	5.80	5.87
24	5.70	5.00	---			---	5.32	5.62	6.01	5.95	5.76	5.88
25	5.35	4.96	---			5.15	5.34	5.61	5.86	5.94	5.78	5.88
26	5.03	5.11	---			5.12	5.46	5.60	5.91	5.90	5.80	5.87
27	5.33	5.33	---			5.06	5.52	5.59	5.97	5.91	5.79	5.58
28	5.36	5.13	---			5.13	5.59	5.60	6.01	6.05	5.82	5.55
29	5.42	4.92	---			5.15	5.56	5.64	5.96	5.98	5.82	5.73
30	5.43	5.02	---			5.09	5.65	5.63	5.89	6.02	5.83	5.90
31	5.25	---	---			5.14	---	5.60	---	6.01	5.81	---
MEAN	5.59	5.18	---			---	5.35	5.63	5.78	5.96	5.87	5.83
MAX	5.87	5.44	---			---	5.65	5.82	6.01	6.05	5.99	6.04
MIN	5.03	4.92	---			---	4.81	5.31	5.58	5.90	5.76	5.55

04165557 CLINTON RIVER BY-PASS AT MOUTH AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°33'41", long 82°50'43", in SW¼ sec.30, T.2 N., R.14 E., Macomb County, Hydrologic Unit 04090003, on left bank at mouth, in Mount Clemens.

PERIOD OF RECORD.--October 1979 to current year (gage heights only).

GAGE.--Water-stage recorder. Altitude of gage is 580 ft (177 m), from topographic map.

REMARKS.--Records fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 3.05 ft (0.930 m) Aug. 4, 1980; minimum recorded, 0.73 ft (0.223 m) Jan. 21-22, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 2.98 ft (0.908 m) July 28; minimum recorded, 0.73 ft (0.223 m) Jan. 21-22.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.34	1.64		---	1.19	2.01		---	2.22	2.59	2.61	2.39
2	2.45	1.79		---	1.17	1.63		---	2.22	2.65	2.56	2.33
3	2.36	---		---	1.16	1.39		---	2.21	2.68	2.50	2.38
4	2.34	---		---	1.21	1.75		---	2.21	2.62	2.54	2.37
5	2.40	---		---	1.30	1.71		---	2.23	2.64	2.48	2.44
6	2.34	---		---	1.31	1.39		---	2.16	2.59	2.49	2.55
7	2.40	---		---	1.35	---		---	2.23	2.59	2.63	2.63
8	2.30	---		---	1.35	1.44		---	2.25	2.57	2.61	2.47
9	2.34	---		---	1.38	1.49		---	2.17	2.53	2.56	2.49
10	2.14	---		---	1.46	1.51		---	2.18	2.55	2.54	2.47
11	2.19	---		---	1.59	1.31		---	2.23	2.63	2.47	2.48
12	2.12	---		---	1.61	---		---	2.26	2.63	2.49	2.42
13	2.21	---		---	1.58	---		---	2.34	2.54	2.47	2.40
14	2.10	---		---	1.57	---		---	2.29	2.52	2.49	2.37
15	2.21	---		---	1.56	---		---	2.22	2.57	2.52	2.36
16	2.28	---		---	1.55	---		---	---	2.54	2.50	2.41
17	2.14	---		---	1.58	---		---	---	2.53	2.53	2.41
18	2.17	---		---	1.62	---		---	---	2.52	2.52	2.42
19	2.13	---		---	1.69	---		---	---	2.54	2.49	2.35
20	2.11	---		---	1.81	---		---	---	2.59	2.48	2.34
21	2.07	---		.73	1.93	---		2.21	---	2.53	2.51	2.38
22	2.16	---		.73	1.96	---		2.21	---	2.56	2.49	2.37
23	2.24	---		.75	2.06	---		2.20	---	2.61	2.45	2.40
24	1.94	---		.82	2.15	---		2.19	---	2.58	2.37	2.47
25	2.09	---		.90	2.18	1.65		2.18	---	2.55	2.38	2.42
26	2.26	---		.99	2.20	1.51		2.18	2.61	2.54	2.40	2.40
27	2.34	---		1.01	2.23	1.64		2.17	2.60	2.55	2.39	2.21
28	2.25	---		1.07	2.11	1.56		2.18	2.68	2.62	2.44	2.09
29	1.86	---		1.13	---	---		2.22	2.57	2.57	2.44	2.27
30	1.90	---		1.17	---	---		2.19	2.49	2.62	2.41	2.50
31	1.97	---		1.18	---	---		2.17	---	2.60	2.40	---
MEAN	2.20	---		---	1.64	---		---	---	2.58	2.49	2.40
MAX	2.45	---		---	2.23	---		---	---	2.68	2.63	2.63
MIN	1.86	---		---	1.16	---		---	---	2.52	2.37	2.09

04165700 DETROIT RIVER AT DETROIT, MI

(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, Hydrologic unit 04090004, at Detroit municipal water treatment facility at Water Works Park at Detroit.

DRAINAGE AREA.--228,800 mi² (592,600 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981 (discontinued).
WATER TEMPERATURES: October 1973 to September 1981 (discontinued).

REMARKS.--Depth-integrated samples were collected from a boat during October, May, and September, along river cross section at north end of Belle Isle. Remaining data were collected as surface samples near the municipal water intake. The intake is in a lagoon at north end of Belle Isle in the Detroit River. Daily temperature values are the mean of three measurements. Daily-mean water discharges are reported for sampling times.

COOPERATION.--Daily mean temperature and specific conductance records are collected by Detroit municipal treatment facility employees. Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8, 1979; minimum daily, 194 micromhos July 24, 1976.
WATER TEMPERATURES: Maximum daily, 24.5°C July 21, 1977, Aug. 29-31, 1980; minimum daily, 0.0°C Jan. 8, 1980.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 185 micromhos was observed Sept. 12, 1979.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum observed, 250 micromhos May 19; minimum observed, 194 micromhos Aug. 19.
WATER TEMPERATURES: Maximum daily, 24.0°C July 18; minimum daily, 0.5 on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 07...	1130	216000	222	8.1	12.5	10.2	96	<1	<1	97	0	27
NOV 18...	1130	211000	225	8.0	5.0	12.6	99	K6	K3	--	--	--
DEC 16...	1540	209000	228	8.0	1.0	15.6	111	K4	K8	95	23	26
JAN 21...	1100	180000	215	7.6	.5	14.6	103	K4	K2	97	21	27
FEB 23...	1530	219000	209	7.7	1.0	13.7	100	K1	61	--	--	24
MAR 24...	1000	204000	238	7.7	2.0	14.3	104	<1	K2	97	0	28
APR 21...	1600	200000	222	7.8	8.0	11.7	99	K1	<1	100	18	28
MAY 19...	1230	206000	250	8.1	10.5	10.9	98	K3	K4	110	20	30
JUN 16...	1615	205000	210	8.1	18.5	9.0	99	K1	K3	96	14	27
JUL 14...	1100	210000	208	8.2	23.0	8.2	95	K8	36	98	16	27
AUG 19...	1045	209000	194	--	21.5	8.4	95	K6	<1	96	--	27
SEP 22...	1145	212000	219	7.9	15.0	8.5	84	E9	K1	98	0	26

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 07...	7.2	4.8	10	.2	.9	.70	120	0	98	1.5	18
NOV 18...	--	--	--	--	--	--	100	0	82	3.7	--
DEC 16...	7.3	4.6	9	.2	.8	--	100	0	82	1.4	17
JAN 21...	7.1	4.0	8	.2	.8	.60	100	0	82	3.7	17
FEB 23...	--	4.6	--	--	.7	.50	96	0	79	2.8	16
MAR 24...	6.6	4.8	10	.2	1.2	.90	120	0	98	3.1	18
APR 21...	7.3	4.3	8	.2	1.0	.70	100	0	82	2.5	18
MAY 19...	7.6	5.7	10	.2	1.1	.80	110	0	90	.0	19
JUN 16...	7.0	3.9	8	.2	.9	.70	100	0	82	1.3	16
JUL 14...	7.4	4.1	8	.2	.9	.70	100	0	82	1.0	17
AUG 19...	7.0	4.2	9	.2	.8	.60	--	0	--	--	15
SEP 22...	6.0	4.7	10	.2	.7	--	120	0	98	2.1	13

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4)
OCT 07...	8.0	.1	1.3	129	128	75200	.29	.29	--	.040	.05
NOV 18...	--	--	--	107	--	61000	.31	.31	.160	.160	.21
DEC 16...	7.2	.1	1.2	105	115	59300	.32	.32	.000	.010	.01
JAN 21...	6.8	<.1	1.3	104	111	50500	.33	.31	.020	.010	.01
FEB 23...	8.2	.1	1.2	113	--	66800	.43	.36	.010	<.010	.01
MAR 24...	8.7	.1	1.1	141	119	77700	.43	.43	.200	.020	.03
APR 21...	8.2	.1	.8	135	119	72900	.36	.35	.050	.030	.04
MAY 19...	9.7	.1	.3	144	136	80100	.58	.57	.040	.020	.03
JUN 16...	6.8	<.1	.9	113	112	62500	.26	.26	.050	.010	.01
JUL 14...	6.6	<.1	1.1	126	115	71400	.26	.26	.010	<.010	.01
AUG 19...	7.3	<.1	1.0	114	109	64300	.26	.26	.020	.030	.04
SEP 22...	8.2	.1	1.7	136	121	77800	.29	.29	.050	.030	.04

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 07...	.15	.16	.45	2.0	.020	.06	.010	1.4	9	5250	100
NOV 18...	.22	.23	.54	2.4	.210	.64	.180	--	--	--	--
DEC 16...	.16	.16	.48	2.1	.010	.03	.000	2.2	--	--	--
JAN 21...	--	<.10	--	--	<.010	.03	<.010	1.4	--	--	--
FEB 23...	.23	.24	.67	3.0	.080	.25	.030	--	--	--	--
MAR 24...	.15	.16	.59	2.6	.020	.06	.020	2.2	--	--	--
APR 21...	.16	.21	.57	2.5	.020	.06	<.010	--	--	--	--
MAY 19...	.33	.37	.95	4.2	.020	.06	<.010	2.5	20	11100	100
JUN 16...	.16	.21	.47	2.1	.010	.03	<.010	1.9	--	--	--
JUL 14...	.27	.28	.54	2.4	<.010	.03	<.010	2.0	--	--	--
AUG 19...	.23	.25	.51	2.3	.010	.03	<.010	1.9	--	--	--
SEP 22...	.39	.44	.73	3.2	.040	.12	<.010	2.4	61	34900	100

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 07...	1130	1	1	<50	30	<1	<1	20	<10	0	0
JAN 21...	1100	2	1	<50	20	<1	<1	10	10	0	0
APR 21...	1600	1	1	100	20	<1	<1	20	<10	2	2
JUL 14...	1100	1	1	100	20	1	<1	10	10	4	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 07...	4	3	280	0	3	1	10	0	<.1	<.1
JAN 21...	3	1	60	<10	0	0	10	<1	<.1	<.1
APR 21...	5	2	630	<10	33	0	30	<1	<.1	<.1
JUL 14...	4	2	220	<10	4	1	10	<1	.1	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
OCT 07...	3	0	0	0	0	0	10	8	1.1	.3
JAN 21...	3	0	0	0	6	0	30	6	1.2	.2
APR 21...	6	1	0	0	1	0	20	<4	2.0	--
JUL 14...	4	4	0	0	0	0	30	5	1.9	.1

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 18,80	MAR 24,81	MAY 19,81	JUN 16,81
TIME	1130	1000	1230	1615
TOTAL CELLS/ML	270	1600	3900	950
DIVERSITY: DIVISION	0.8	0.0	1.5	1.2
.CLASS	0.8	0.0	1.5	1.2
..ORDER	1.0	0.8	2.4	1.4
...FAMILY	1.2	1.4	3.2	1.6
....GENUS	1.2	2.2	3.5	1.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....TETRAEDRON	--	-	--	-	--	-	--	-
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	39	4
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	62	2	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	220	6	--	-
....KIRCHNERIELLA	--	-	--	-	31	1	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	310	8	--	-
....TETRASTRUM	--	-	--	-	62	2	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	47	1	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	26	10	39	2	580	15	26	3
....MELOSIRA	--	-	--	-	140	4	--	-
....STEPHANODISCUS	--	-	320#	20	--	-	13	1
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	31	1	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	31	1	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	190	5	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	260#	16	260	7	--	-
....FRAGILARIA	--	-	720#	46	--	-	13	1
....SYNEDRA	13	5	39	2	78	2	39	4
...NAVICULACEAE								
....NAVICULA	--	-	--	-	31	1	--	-
...NITZSCHIACEAE								
....NITZSCHIA	26	10	51	3	250	6	--	-
...SURIRELLACEAE								
....CYMATOPLEURA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	150	10	120	3	280#	30
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-
...SYNURACEAE								
....MALLOMONAS	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	*	0	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	210#	76	--	-	580	15	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	860#	22	540#	57

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 14,81		AUG 19,81		SEP 2,81		SEP 16,81	
TIME	1100		1045		1145		1415	
TOTAL CELLS/ML	190		980		110		6800	
DIVERSITY: DIVISION	0.4		1.8		0.0		1.0	
.CLASS	0.4		2.2		0.0		1.0	
..ORDER	1.1		2.5		0.9		1.9	
...FAMILY	1.1		2.8		1.6		2.1	
....GENUS	1.6		2.8		1.6		2.3	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....TETRAEDRON	--	-	42	4	--	-	90	1
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	--	-	--	-	*	0
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	51	1
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	14	1	--	-	64	1
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	51	1
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	210	3
....SCENEDESMUS	--	-	84	9	--	-	150	2
....TETRASTRUM	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	42	4	--	-	77	1
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	120#	60	320#	33	--	-	150	2
....MELOSIRA	26	13	--	-	37#	33	220	3
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	39#	20	--	-	--	-	--	-
....SYNEDRA	--	-	14	1	37#	33	*	0
...NAVICULACEAE								
....NAVICULA	--	-	28	3	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	--	-	180	3
...SURIRELLACEAE								
....CYMATOPLEURA	--	-	--	-	37#	33	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	130	13	--	-	--	-
...SYNURACEAE								
....MALLOMONAS	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	150#	16	--	-	*	0
...CRYPTOMONADACEAE								
....CRYPTOMONAS	13	7	--	-	--	-	51	1
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	51	1
....ANACYSTIS	--	-	150#	16	--	-	3400#	51
....COCCOCHLORIS	--	-	--	-	--	-	*	0
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	1900#	28

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	220	212	210	215	221	230	215	218	203	210	224
2	230	218	220	218	223	222	232	215	214	208	212	220
3	212	222	220	224	212	230	227	210	220	228	222	226
4	212	220	---	222	228	223	214	212	---	220	224	224
5	217	202	214	222	226	213	227	215	222	217	224	220
6	216	220	220	226	226	221	225	215	230	220	230	225
7	214	222	214	226	214	213	232	230	220	222	230	222
8	216	217	215	224	211	211	235	237	225	220	223	222
9	211	222	215	232	212	210	235	227	224	227	223	222
10	219	222	212	218	220	202	230	222	222	212	230	225
11	224	220	222	213	220	205	230	232	222	221	230	218
12	221	222	241	217	225	222	235	220	218	221	230	229
13	223	222	212	200	230	222	238	225	216	221	---	231
14	225	198	225	210	227	205	240	220	218	225	220	229
15	222	210	215	215	235	204	230	216	217	222	218	229
16	225	210	219	230	212	220	217	216	217	232	223	229
17	216	215	215	230	212	220	220	218	217	211	231	223
18	218	215	228	230	235	220	217	217	218	220	216	232
19	217	202	222	235	222	221	207	217	227	222	210	233
20	215	215	202	235	235	228	217	220	225	206	211	230
21	215	200	220	230	213	222	217	218	224	214	222	230
22	213	220	220	222	200	210	217	228	230	204	230	228
23	212	220	217	227	213	221	216	235	223	224	230	230
24	223	212	237	220	200	222	220	235	223	225	230	229
25	230	212	240	210	217	222	220	238	223	203	230	236
26	220	221	210	220	215	230	224	234	206	212	230	232
27	232	212	207	235	222	232	220	230	208	222	230	232
28	235	212	210	218	219	230	222	238	213	220	222	236
29	220	215	218	220	---	222	222	223	220	222	220	230
30	232	220	208	220	---	223	224	212	215	222	222	230
31	212	---	210	228	---	228	---	211	---	222	221	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.0	7.0	4.5	.5	.5	.5	6.0	9.0	14.5	20.5	22.0	23.0
2	16.0	7.0	4.5	.5	.5	1.0	6.5	9.0	15.0	20.5	22.0	23.0
3	16.5	8.0	3.5	.5	.5	.5	6.0	9.0	16.0	21.0	23.5	22.0
4	15.5	8.5	3.5	.5	.5	.5	7.0	9.5	16.0	21.5	23.5	22.0
5	14.5	8.0	3.5	.5	.5	.5	7.0	10.0	16.5	21.5	23.5	21.0
6	14.0	8.0	3.5	.5	.5	.5	6.0	10.0	17.0	22.0	23.5	20.5
7	13.5	8.5	3.0	.5	.5	.5	7.0	9.5	17.0	23.5	23.5	20.5
8	13.5	8.5	3.5	.5	.5	1.0	8.0	10.5	17.0	23.5	23.5	20.5
9	13.5	8.5	4.0	.5	.5	1.5	8.0	10.5	18.0	23.5	23.5	20.0
10	13.5	8.0	4.0	.5	.5	1.5	7.0	10.5	18.0	23.5	23.5	20.0
11	14.0	7.0	3.5	.5	.5	1.0	8.0	10.0	17.0	23.5	23.5	20.0
12	13.5	6.5	3.0	.5	.5	2.0	8.5	9.5	18.0	24.0	23.5	20.5
13	12.0	6.5	3.0	.5	.5	1.5	8.5	10.0	18.5	24.0	23.5	20.5
14	11.5	6.5	1.5	.5	.5	1.5	8.5	10.0	18.5	24.0	23.5	21.0
15	11.0	6.0	1.0	.5	.5	2.0	8.5	9.5	18.5	23.5	23.5	21.0
16	11.0	5.5	1.0	.5	.5	1.5	7.0	9.5	19.0	23.5	23.0	20.5
17	11.0	5.5	.5	.5	.5	1.5	8.0	9.0	19.0	23.5	22.0	19.5
18	11.5	5.5	.5	.5	.5	1.0	8.0	9.0	19.0	24.0	22.0	18.5
19	11.5	5.0	.5	.5	.5	1.0	8.0	9.5	19.0	23.5	21.5	18.0
20	11.5	4.5	.5	.5	.5	1.0	5.5	10.0	19.0	23.5	21.5	16.5
21	11.5	5.0	.5	.5	.5	1.0	6.5	11.0	19.0	23.5	22.0	16.5
22	11.0	4.5	.5	.5	1.0	1.5	8.0	12.0	19.5	23.0	22.0	16.0
23	10.5	4.5	.5	.5	1.0	2.0	8.0	13.0	19.0	23.0	22.0	15.5
24	10.0	5.0	.5	.5	1.5	2.0	8.0	14.0	18.5	22.0	23.0	15.5
25	10.0	5.0	.5	.5	1.0	2.5	6.5	14.5	19.0	23.0	22.0	15.5
26	9.5	4.5	.5	.5	1.0	3.0	7.0	14.5	19.0	23.0	22.0	15.5
27	9.5	4.5	.5	.5	.5	3.5	7.0	14.5	19.0	22.0	23.0	16.0
28	8.5	4.0	.5	.5	.5	4.5	8.5	14.5	19.5	22.0	22.0	15.5
29	8.5	3.5	.5	.5	---	5.0	9.0	15.0	20.0	21.5	22.0	15.5
30	8.0	4.5	.5	.5	---	5.0	9.0	15.0	20.5	21.5	23.0	15.0
31	7.0	---	.5	.5	---	5.5	---	14.5	---	21.5	23.0	---

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW¼ sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft (8 m) downstream from mouth of Quarton Lake outlet, and 100 ft (30 m) upstream from bridge on Maple Road, in Birmingham.

DRAINAGE AREA.--33.3 mi² (86.2 km²). Prior to water year 1971, drainage area was 36.9 mi² (95.6 km²). An area of 3.6 mi² (9.3 km²) noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27, 1962. Datum of gage is 715.94 ft (218.219 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Quarton Lake above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years (water years 1951-70), 15.3 ft³/s (0.433 m³/s), 5.63 in/yr (143 mm/yr); 11 years (water years 1971-81), 21.8 ft³/s (0.617 m³/s), 8.89 in/yr (226 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) June 26, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.10 ft³/s (0.003 m³/s) Aug. 8, 9, 1963; minimum gage height, 1.02 ft (0.311 m) Oct. 12, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 439 ft³/s (12.4 m³/s) Sept. 30, stage rising, peak occurred Oct. 1, 1981; maximum peak discharge, 220 ft³/s (6.23 m³/s) Feb. 18, gage height, 3.45 ft (1.052 m), only peak above base of 180 ft³/s (5.10 m³/s); minimum discharge, 2.6 ft³/s (0.074 m³/s) July 19, gage height, 1.57 ft (0.479 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	7.2	11	9.0	16	36	16	23	13	5.3	6.4	11
2	23	8.1	39	8.7	18	31	13	20	12	5.0	6.0	17
3	15	8.8	23	8.3	13	28	13	20	14	4.7	7.2	20
4	13	9.3	14	8.0	12	27	14	19	12	4.7	5.7	78
5	12	8.3	12	7.5	12	26	14	21	9.9	4.7	4.7	28
6	11	8.2	12	7.0	11	24	13	17	9.5	4.4	4.7	15
7	12	9.4	31	7.3	10	23	11	16	8.1	4.4	4.7	11
8	12	11	54	8.0	9.5	22	11	14	30	4.1	5.0	9.0
9	11	9.4	41	8.4	9.0	22	16	15	22	11	15	7.6
10	11	9.2	22	7.9	11	22	15	39	13	12	7.2	6.7
11	11	8.4	16	7.3	56	22	44	81	9.9	5.7	6.7	6.7
12	10	8.4	14	7.1	20	20	43	40	9.0	5.0	6.0	6.7
13	10	7.8	13	8.0	15	20	33	26	16	5.0	5.7	6.0
14	12	8.8	11	8.7	13	17	91	26	22	4.4	5.7	5.7
15	15	8.6	10	8.9	15	17	46	43	17	3.8	20	5.3
16	13	8.5	9.9	8.9	49	17	29	48	11	4.7	8.1	11
17	12	7.6	9.1	9.2	127	17	30	28	9.5	4.4	5.3	22
18	11	7.6	9.1	10	191	16	27	22	7.6	3.5	4.7	14
19	10	7.5	8.5	9.5	164	15	21	20	7.6	3.2	4.4	9.0
20	9.5	7.5	7.8	11	99	14	20	19	8.5	4.7	4.4	7.2
21	8.8	7.5	7.0	10	70	14	19	16	9.5	4.7	3.8	12
22	8.6	7.6	7.2	9.8	60	14	22	15	27	4.1	3.8	42
23	7.3	7.7	7.7	10	117	13	108	13	16	3.5	3.8	14
24	8.0	8.3	8.2	11	78	13	44	17	9.9	4.7	3.5	9.9
25	15	8.7	7.8	12	53	13	31	24	8.5	3.8	3.5	8.5
26	10	7.8	7.3	16	42	25	26	16	7.2	4.4	3.5	8.1
27	8.2	9.3	7.1	18	35	30	24	36	6.4	4.1	8.5	9.9
28	9.0	15	7.9	15	43	18	30	27	5.7	74	4.4	7.6
29	8.2	13	9.2	14	---	17	35	20	5.3	33	11	6.4
30	8.0	11	9.3	12	---	19	26	21	5.7	12	42	46
31	7.4	---	9.2	12	---	19	---	17	---	8.1	14	---
TOTAL	346.0	265.5	455.3	308.5	1368.5	631	885	779	362.8	261.1	239.4	461.3
MEAN	11.2	8.85	14.7	9.95	48.9	20.4	29.5	25.1	12.1	8.42	7.72	15.4
MAX	23	15	54	18	191	36	108	81	30	74	42	78
MIN	7.3	7.2	7.0	7.0	9.0	13	11	13	5.3	3.2	3.5	5.3
CFSM	.34	.27	.44	.30	1.47	.61	.89	.75	.36	.25	.23	.46
IN.	.39	.30	.51	.34	1.53	.70	.99	.87	.41	.29	.27	.52

CAL YR 1980 TOTAL 8340.7 MEAN 22.8 MAX 302 MIN 4.5 CFSM .69 IN 9.32
WTR YR 1981 TOTAL 6363.4 MEAN 17.4 MAX 191 MIN 3.2 CFSM .52 IN 7.11

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW¼ sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi (6.8 km) east of Farmington.

DRAINAGE AREA.--87.9 mi^2 (227.7 km^2).

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft (185.812 m) city of Southfield datum. Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 58.3 ft^3/s (1.651 m^3/s), 9.01 in/yr (229 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft^3/s (139 m^3/s) June 26, 1968, gage height, 19.04 ft (5.803 m); minimum, 0.1 ft^3/s (0.003 m^3/s) Aug. 2, 1964, gage height, 1.15 ft (0.351 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft^3/s (14.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	(m^3/s)	Gage height (ft)	(m)
Feb. 19	--	*600	17.0	*a10.76	3.280
Apr. 14	1900	580	16.4	8.38	2.554
Sept. 4	1100	523	14.8	8.00	2.438

a Ice jam.

Minimum discharge, 9.3 ft^3/s (0.26 m^3/s) Aug. 26, gage height, 2.49 ft (0.759 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	26	33	27	45	105	48	70	38	16	23	29
2	82	24	114	25	53	90	41	59	34	16	19	33
3	49	24	84	24	40	78	37	53	39	15	18	42
4	42	25	51	23	38	74	39	48	38	14	18	394
5	39	26	44	22	36	73	39	47	31	14	16	138
6	34	24	43	21	34	66	35	45	28	13	14	67
7	35	24	131	21	32	62	32	39	24	12	14	48
8	34	34	223	22	30	59	31	37	46	12	14	38
9	32	29	171	25	27	58	45	35	85	19	22	35
10	30	27	83	23	35	58	42	84	38	39	20	27
11	32	25	50	22	170	57	109	333	29	18	17	24
12	30	23	42	21	80	53	111	143	25	14	15	22
13	28	23	37	22	45	52	91	85	63	17	15	21
14	29	28	33	23	40	48	361	85	84	14	26	24
15	49	28	30	23	45	47	169	203	58	12	74	19
16	38	24	29	25	100	48	90	175	36	14	32	27
17	36	24	27	26	300	46	86	97	30	13	19	75
18	38	23	27	27	500	45	123	75	25	11	15	48
19	34	22	25	29	550	43	73	64	22	10	14	32
20	33	22	23	32	500	41	62	58	22	15	12	25
21	30	22	21	27	280	40	55	52	22	17	11	26
22	28	23	21	29	200	39	51	46	78	13	11	192
23	27	23	22	30	400	39	231	42	45	11	11	60
24	26	25	24	31	340	37	155	40	29	10	10	37
25	53	26	23	37	189	36	93	53	25	11	9.8	31
26	38	23	22	45	132	71	74	43	22	18	9.5	30
27	30	26	21	50	105	88	67	76	18	16	11	37
28	34	56	23	45	119	54	95	79	17	204	16	30
29	31	44	27	41	---	48	140	50	16	175	28	25
30	28	36	27	35	---	54	84	63	15	46	128	41
31	27	---	27	35	---	59	---	49	---	30	47	---
TOTAL	1109	809	1558	888	4465	1768	2709	2428	1082	859	709.3	1677
MEAN	35.8	27.0	50.3	28.6	159	57.0	90.3	78.3	36.1	27.7	22.9	55.9
MAX	82	56	223	50	550	105	361	333	85	204	128	394
MIN	26	22	21	21	27	36	31	35	15	10	9.5	19
CFSM	.41	.31	.57	.33	1.81	.65	1.03	.89	.41	.32	.26	.64
IN.	.47	.34	.66	.38	1.89	.75	1.15	1.03	.46	.36	.30	.71

CAL YR 1980 TOTAL 25518.0 MEAN 69.7 MAX 814 MIN 12 CFSM .79 IN 10.80
WTR YR 1981 TOTAL 20061.3 MEAN 55.0 MAX 550 MIN 9.5 CFSM .63 IN 8.49

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE¼ sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft (6 m) upstream from bridge on Nine-Mile Road, at Southfield, 1.6 mi (2.6 km) upstream from mouth, and 5.5 mi (8.8 km) east of Farmington.

DRAINAGE AREA.--9.49 mi² (24.58 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft (187.473 m) city of Southfield datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 8.14 ft³/s (0.231 m³/s), 11.65 in/yr (296 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 903 ft³/s (25.6 m³/s) June 25, 1968, gage height, 12.95 ft (3.947 m), from rating curve extended above 410 ft³/s (11.6 m³/s); no flow part of each day Aug. 30, 31, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 270 ft³/s (7.65 m³/s), revised, and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 23	0630	278	7.87	8.47	2.582	July 28	1700	298	8.44	8.54	2.603
July 28	1130	317	8.98	8.69	2.649	Sep. 30	2400	*a476	13.5	*9.91	3.021

a Stage rising, peak occurred Oct. 1, 1981.

Minimum discharge not determined; minimum daily, 1.3 ft³/s (0.037 m³/s) Nov. 19, 26, June 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	2.2	1.8	2.2	4.0	6.8	4.1	6.1	3.1	2.4	3.1	24
2	13	2.0	23	2.1	4.5	6.1	3.8	4.4	3.0	1.9	3.1	6.4
3	3.8	2.0	3.8	2.0	3.9	5.1	3.5	3.7	6.6	1.6	3.4	24
4	3.8	2.1	2.1	1.9	3.0	5.5	5.0	3.3	2.9	2.3	3.0	63
5	2.7	2.2	2.1	1.8	2.9	5.7	3.7	3.0	2.1	4.4	2.8	8.2
6	2.4	2.2	2.2	1.7	2.8	4.8	3.0	2.9	2.2	1.9	2.8	3.8
7	3.8	2.4	27	1.7	2.7	4.4	3.3	2.8	2.0	1.8	3.1	3.0
8	2.4	5.6	39	1.8	2.5	4.6	3.3	2.7	11	1.9	4.3	3.7
9	2.2	2.1	10	1.9	2.5	4.6	8.4	2.4	11	7.7	5.6	4.2
10	2.2	2.3	5.2	1.9	3.0	4.7	2.8	26	2.6	4.2	2.1	2.0
11	3.8	1.8	3.6	1.8	17	4.9	29	29	2.2	2.2	4.6	1.9
12	4.1	2.2	3.2	1.8	8.0	4.7	15	7.6	2.2	2.2	2.1	1.9
13	2.4	2.1	3.1	2.0	5.5	4.6	6.6	4.9	20	5.3	7.1	2.0
14	5.4	5.1	2.4	2.3	5.0	4.5	59	12	13	2.2	5.5	5.4
15	6.1	2.0	2.4	2.4	6.0	4.7	9.3	32	4.4	1.8	30	1.4
16	3.2	1.8	2.3	2.7	34	5.0	6.5	14	2.9	2.9	3.4	20
17	3.0	1.6	2.2	2.8	71	5.4	8.9	6.7	2.8	1.8	3.5	14
18	4.1	1.5	2.1	2.5	56	5.1	15	4.9	2.4	1.4	2.0	3.5
19	3.0	1.3	2.0	2.4	33	4.5	5.0	4.2	2.2	1.6	1.5	1.6
20	3.8	1.6	2.0	2.4	21	4.5	4.0	4.0	2.4	6.8	1.9	1.5
21	3.0	1.7	2.0	2.4	13	4.1	3.5	3.7	2.8	4.4	1.9	6.5
22	2.7	1.6	2.0	2.4	14	4.0	4.4	4.1	21	1.6	2.0	48
23	2.4	1.5	1.9	2.5	52	4.1	73	4.0	3.2	1.5	1.8	3.1
24	3.5	2.1	1.9	2.7	23	4.3	9.5	3.8	3.1	1.5	2.1	2.1
25	10	2.1	1.9	3.0	11	3.8	6.1	3.9	2.4	1.8	2.2	2.0
26	2.4	1.3	1.9	4.2	8.4	20	4.6	3.5	1.8	10	2.3	1.9
27	2.2	7.5	1.9	3.7	6.8	7.5	4.0	10	2.0	2.6	3.4	5.0
28	5.4	7.2	1.9	3.4	9.4	4.7	25	3.9	1.4	134	5.4	2.0
29	2.4	3.2	2.0	3.0	---	4.5	19	2.9	1.3	7.9	18	2.0
30	2.2	1.9	2.2	2.7	---	12	7.7	9.8	1.7	3.5	34	30
31	2.4	---	2.2	2.5	---	6.0	---	3.0	---	2.8	3.2	---
TOTAL	117.0	76.2	163.3	74.6	425.9	175.2	356.0	229.2	141.7	229.9	171.2	298.1
MEAN	3.77	2.54	5.27	2.41	15.2	5.65	11.9	7.39	4.72	7.42	5.52	9.94
MAX	13	7.5	39	4.2	71	20	73	32	21	134	34	63
MIN	2.2	1.3	1.8	1.7	2.5	3.8	2.8	2.4	1.3	1.4	1.5	1.4
CFSM	.40	.27	.56	.25	1.60	.60	1.25	.78	.50	.78	.58	1.05
IN.	.46	.30	.64	.29	1.67	.69	1.40	.90	.56	.90	.67	1.17

CAL YR 1980 TOTAL 3162.0 MEAN 8.64 MAX 134 MIN 1.1 CFSM .91 IN 12.39
WTR YR 1981 TOTAL 2458.3 MEAN 6.74 MAX 134 MIN 1.3 CFSM .71 IN 9.64

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW¼ sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft (244 m) downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi^2 (45.3 km^2).

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft (210.43 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 11.5 ft^3/s (0.326 m^3/s), 8.92 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s (42.5 m^3/s) June 25, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.07 ft^3/s (0.002 m^3/s) Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft^3/s (0.009 m^3/s) Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 120 ft^3/s (3.40 m^3/s), revised, and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 18	--	*200	5.66	*a6.13	1.868	Sept. 4	0300	127	3.60	4.09	1.247
Feb. 23	0300	132	3.74	4.14	1.262						

a Ice jam.

Minimum discharge, 0.46 ft^3/s (0.013 m^3/s) May 7, gage height, 2.71 ft (0.826 m), caused by unusual regulation; minimum daily, 2.0 ft^3/s (0.057 m^3/s) Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.2	3.1	5.3	3.8	6.5	20	9.4	20	9.6	3.1	4.3	5.7
2	10	3.1	20	3.7	7.5	16	8.2	17	8.3	3.0	3.4	5.3
3	6.7	3.1	14	3.6	6.0	13	7.8	14	8.6	2.6	3.2	21
4	5.4	3.4	8.6	3.5	5.5	13	8.2	13	8.2	2.6	3.2	86
5	5.0	3.4	6.5	3.5	5.0	12	7.8	12	6.8	2.6	3.3	31
6	4.6	3.2	6.5	3.4	4.0	11	7.0	11	5.7	2.4	3.3	13
7	4.7	3.4	21	3.4	3.8	9.8	7.0	9.7	5.1	2.2	2.8	8.1
8	4.4	4.6	40	3.4	3.7	9.2	6.7	9.0	7.8	2.4	3.0	6.4
9	3.9	4.0	32	3.4	3.7	9.6	9.0	8.9	16	3.5	4.2	5.0
10	3.7	3.8	15	3.3	3.7	9.4	8.2	22	8.3	4.6	2.7	4.6
11	3.6	3.3	9.6	3.3	40	8.8	23	72	6.1	2.9	2.8	4.2
12	3.6	3.2	8.0	3.3	20	8.1	20	43	5.3	2.6	2.4	3.8
13	3.6	3.3	6.5	3.6	12	8.3	17	25	15	3.7	2.3	3.2
14	4.1	4.1	5.5	3.8	10	7.2	75	22	23	2.9	2.2	3.9
15	6.2	4.0	5.0	3.8	12	7.7	34	55	15	2.3	12	3.0
16	5.2	3.5	4.5	3.8	40	8.1	22	54	9.2	2.9	5.9	4.6
17	4.9	3.5	4.3	3.9	120	7.7	22	33	7.2	2.5	3.9	10
18	4.5	3.9	4.1	4.0	180	7.0	43	24	6.0	2.2	2.9	7.4
19	3.9	3.7	3.9	4.2	180	6.4	21	19	5.3	2.4	2.5	5.6
20	4.2	3.4	3.7	4.5	120	6.4	16	15	4.2	3.7	2.2	4.4
21	3.9	3.3	3.5	4.4	67	6.7	13	13	4.2	4.0	2.0	5.1
22	3.3	2.9	3.4	4.1	56	7.4	12	11	17	3.3	2.1	35
23	3.4	3.0	3.3	4.2	112	6.7	76	10	8.6	2.9	2.2	13
24	4.1	3.3	3.3	4.5	74	7.0	39	8.8	5.9	2.6	2.2	7.4
25	7.8	3.0	3.3	5.0	41	7.0	25	8.7	5.2	2.2	2.4	5.9
26	5.1	3.0	3.3	6.0	31	13	20	7.8	4.0	3.6	2.3	6.4
27	4.2	3.4	3.4	7.5	21	15	17	28	3.6	3.6	2.9	7.3
28	4.5	6.3	3.5	6.5	24	11	26	28	3.1	53	4.4	5.3
29	4.2	5.8	3.6	5.5	---	9.8	33	15	3.2	30	11	4.5
30	3.6	5.3	3.8	5.0	---	11	23	17	3.0	9.3	27	12
31	3.6	---	3.9	5.0	---	11	---	13	---	6.0	8.1	---
TOTAL	144.1	110.3	262.3	130.9	1209.4	304.3	656.3	658.9	238.5	177.6	139.1	338.1
MEAN	4.65	3.68	8.46	4.22	43.2	9.82	21.9	21.3	7.95	5.73	4.49	11.3
MAX	10	6.3	40	7.5	180	20	76	72	23	53	27	86
MIN	3.3	2.9	3.3	3.3	3.7	6.4	6.7	7.8	3.0	2.2	2.0	3.0
CFSM	.27	.21	.48	.24	2.47	.56	1.25	1.22	.45	.33	.26	.65
IN.	.31	.23	.56	.28	2.57	.65	1.40	1.40	.51	.38	.30	.72

CAL YR 1980 TOTAL 4919.2 MEAN 13.4 MAX 250 MIN 2.0 CFSM .77 IN 10.46
WTR YR 1981 TOTAL 4369.8 MEAN 12.0 MAX 180 MIN 2.0 CFSM .69 IN 9.29

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW¼ sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft (152 m) upstream from bridge on Plymouth Road in Detroit, and 4 mi (6 km) upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi^2 (484 km^2).

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi (2 km) downstream at datum 4.6 ft (1.4 m) lower.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Mar. 22 to June 4, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 113 ft^3/s (3.200 m^3/s), 8.21 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft^3/s (368 m^3/s) Apr. 5, 1947; maximum gage height, 23.0 ft (7.01 m) Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft^3/s (0.051 m^3/s) Aug. 1, 2, 1964, gage height, 3.00 ft (0.914 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s (34.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 19	1000	*1,310	37.1	*12.59	3.837	Sept. 4	1600	1,270	36.0	12.41	3.783

Minimum discharge, 16 ft^3/s (0.45 m^3/s) Aug. 26, gage height, 3.91 ft (1.192 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	40	54	50	86	194	90	130	70	29	40	57
2	136	36	195	47	95	164	70	110	60	28	33	66
3	79	35	184	45	75	141	65	95	65	27	31	125
4	63	38	83	43	65	133	70	85	54	25	30	1060
5	59	40	67	40	62	128	66	80	48	27	27	409
6	50	40	61	39	60	118	64	76	44	24	25	133
7	50	40	238	40	55	108	58	70	39	24	34	86
8	48	51	405	43	50	103	54	65	83	22	44	71
9	48	52	399	46	48	102	78	60	159	63	44	63
10	43	45	155	42	55	102	74	140	70	105	46	49
11	45	42	102	40	300	100	140	600	48	38	40	44
12	47	36	82	40	170	95	130	300	39	26	28	40
13	41	35	75	44	130	92	120	150	108	106	25	58
14	39	50	63	46	70	86	600	160	245	41	55	207
15	75	52	55	47	120	83	350	350	165	24	187	49
16	60	40	52	49	250	92	180	300	71	21	75	183
17	53	36	50	52	777	83	150	200	54	27	36	191
18	59	48	50	55	1180	82	200	140	45	21	27	99
19	55	50	47	55	1250	75	150	120	41	20	24	63
20	49	47	42	60	891	73	110	100	43	70	24	50
21	46	34	39	55	540	72	100	90	38	47	21	48
22	41	35	39	55	370	70	90	80	176	32	19	425
23	38	35	43	58	833	66	400	75	96	23	19	141
24	38	40	45	60	657	64	270	70	54	19	20	73
25	99	44	42	70	352	62	190	90	48	18	19	57
26	71	39	40	85	247	100	140	75	42	40	18	53
27	48	52	40	95	195	150	120	110	35	43	19	70
28	54	113	45	85	202	100	230	130	31	519	27	59
29	53	83	50	75	---	85	200	100	29	438	54	44
30	42	65	50	65	---	90	160	100	29	97	256	135
31	40	---	50	63	---	100	---	90	---	54	107	---
TOTAL	1717	1393	2942	1689	9185	3113	4719	4341	2129	2098	1454	4208
MEAN	55.4	46.4	94.9	54.5	328	100	157	140	71.0	67.7	46.9	140
MAX	136	113	405	95	1250	194	600	600	245	519	256	1060
MIN	38	34	39	39	48	62	54	60	29	18	18	40
CFSM	.30	.25	.51	.29	1.75	.54	.84	.75	.38	.36	.25	.75
IN.	.34	.28	.59	.34	1.83	.62	.94	.86	.42	.42	.29	.84

CAL YR 1980 TOTAL 50330 MEAN 138 MAX 1630 MIN 21 CFSM .74 IN 10.01
WTR YR 1981 TOTAL 38988 MEAN 107 MAX 1250 MIN 18 CFSM .57 IN 7.76

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW¼ SE¼ sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft (3 m) downstream from bridge on John Daly Road, 0.6 mi (1.0 km) northeast of Inkster, and 4.8 mi (7.7 km) upstream from mouth.

DRAINAGE AREA.--83.2 mi^2 (215.5 km^2).

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft (180.789 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 51.7 ft^3/s (1.464 m^3/s), 8.44 in/yr (214 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft^3/s (102 m^3/s) June 26, 1968, gage height, 13.62 ft (4.151 m); minimum, 0.2 ft^3/s (0.006 m^3/s) Sept. 13, 1955, Jan. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,110 ft^3/s (31.4 m^3/s) Feb. 19, gage height, 9.58 ft (2.920 m), only peak above base of 900 ft^3/s (25.5 m^3/s); minimum, 1.7 ft^3/s (0.048 m^3/s) Aug. 24-27; minimum gage height, 2.64 ft (0.805 m) Aug. 24-29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	11	19	8.5	27	111	41	64	16	8.5	8.5	27
2	34	9.9	71	8.0	39	92	33	54	12	5.4	6.2	19
3	23	8.8	78	7.5	20	71	27	39	24	4.8	6.3	34
4	16	8.0	41	7.0	17	63	26	32	19	4.6	7.2	425
5	13	14	36	6.5	12	59	22	29	16	4.4	5.0	405
6	11	11	29	6.5	11	54	19	27	16	3.7	4.2	98
7	11	9.7	84	6.5	9.4	44	17	23	9.7	3.1	4.9	49
8	10	10	252	7.0	8.8	41	16	21	14	3.1	9.9	33
9	9.2	9.1	302	7.5	8.0	39	22	19	15	13	11	23
10	8.1	8.2	137	7.5	12	40	18	57	8.4	13	5.7	20
11	9.8	7.8	79	6.9	160	41	120	168	6.1	12	4.0	16
12	7.5	7.6	51	6.4	48	37	340	155	6.9	4.1	3.7	11
13	6.8	6.9	42	6.5	43	36	169	77	67	7.5	2.8	9.4
14	8.2	12	30	6.8	44	31	420	86	76	3.9	2.6	14
15	12	12	26	7.3	47	29	377	259	59	3.5	45	19
16	8.5	9.2	21	8.3	109	28	134	301	29	3.5	15	83
17	11	8.4	17	8.5	327	26	100	121	18	4.4	5.9	59
18	14	7.7	15	8.5	603	24	85	70	15	4.0	3.5	36
19	11	7.2	12	8.8	999	21	61	49	13	8.9	2.5	22
20	11	7.3	10	11	813	21	50	37	14	108	2.2	15
21	9.7	8.4	8.9	8.8	497	22	41	32	13	42	5.7	36
22	8.5	8.1	7.2	9.3	310	18	35	26	81	17	9.0	149
23	7.4	7.7	7.5	10	536	18	260	19	32	8.3	4.8	62
24	10	8.0	7.5	10	608	18	195	16	16	6.8	1.9	32
25	27	8.2	7.2	11	275	18	99	16	12	4.1	1.7	23
26	18	7.7	6.9	22	179	58	66	14	12	41	1.7	19
27	15	17	6.9	29	121	76	53	23	9.6	14	1.7	24
28	19	32	6.7	23	109	52	93	20	6.7	69	1.9	20
29	15	26	7.0	19	---	40	131	18	5.9	85	8.4	16
30	12	22	8.0	15	---	45	92	34	5.7	27	75	78
31	13	---	8.5	15	---	48	---	24	---	12	20	---
TOTAL	403.7	330.9	1434.3	323.6	5992.2	1321	3162	1930	648.0	549.6	287.9	1876.4
MEAN	13.0	11.0	46.3	10.4	214	42.6	105	62.3	21.6	17.7	9.29	62.5
MAX	34	32	302	29	999	111	420	301	81	108	75	425
MIN	6.8	6.9	6.7	6.4	8.0	18	16	14	5.7	3.1	1.7	9.4
CFSM	.16	.13	.56	.13	2.57	.51	1.26	.75	.26	.21	.11	.75
IN.	.18	.15	.64	.14	2.68	.59	1.41	.86	.29	.25	.13	.84

CAL YR 1980 TOTAL 22721.6 MEAN 62.1 MAX 895 MIN 4.5 CFSM .75 IN 10.16
WTR YR 1981 TOTAL 18259.6 MEAN 50.0 MAX 999 MIN 1.7 CFSM .60 IN 8.16

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE¼ sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, n left bank 40 ft (12 m) downstream from bridge on General Motors Road, 0.5 mi (0.8 km) downstream from Sherwood Creek, and 0.5 mi (0.8 km) west of Milford.

DRAINAGE AREA.--132 mi^2 (342 km^2).

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft (268.224 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1970, at site 240 ft (73 m) upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft^3/s (8.50 m^3/s) regulated by powerplant 1.5 mi (2.4 km) above station prior to May 20, 1957; occasional regulation for lake level control since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 96.5 ft^3/s (2.733 m^3/s), 9.93 in/yr (252 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 645 ft^3/s (18.3 m^3/s) Apr. 5, 1950; maximum gage height, 8.26 ft (2.518 m) June 28, 1968; minimum daily discharge, 5.2 ft^3/s (0.15 m^3/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 261 ft^3/s (7.39 m^3/s) Sept. 5, gage height, 6.58 ft (2.006 m); minimum, 24 ft^3/s (0.68 m^3/s) Aug. 25, 26, 27; minimum gage height, 4.17 ft (1.271 m) Aug. 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	95	75	82	90	66	170	103	137	87	46	49	55
2	106	73	102	87	71	165	101	133	72	45	45	51
3	103	71	108	84	69	160	95	126	66	44	42	56
4	104	72	104	78	69	155	101	121	64	44	36	236
5	103	82	101	78	67	145	99	114	60	41	33	258
6	99	80	102	77	68	140	96	109	50	38	31	234
7	93	78	118	78	69	132	94	100	52	35	34	181
8	87	78	139	75	68	126	90	92	61	31	36	147
9	83	77	154	73	66	122	96	86	71	31	36	132
10	77	82	142	71	67	120	98	104	63	35	31	123
11	73	81	133	69	88	116	126	150	64	31	29	114
12	72	77	129	68	83	112	145	149	64	28	29	107
13	75	74	126	67	79	114	144	136	71	35	31	98
14	76	77	122	67	85	109	151	126	89	32	32	92
15	78	81	121	67	100	107	170	139	90	29	51	84
16	79	79	118	67	125	109	161	161	77	29	45	79
17	82	76	116	67	160	106	157	155	74	29	37	92
18	81	74	116	67	180	103	165	141	69	29	34	84
19	82	72	113	66	190	100	168	130	64	30	33	76
20	81	70	110	65	200	99	152	122	59	33	31	71
21	79	67	107	64	215	100	141	116	59	40	30	73
22	77	67	106	63	225	99	134	111	77	39	30	111
23	78	67	105	63	220	94	164	107	76	37	30	108
24	78	68	105	63	210	92	177	105	69	35	29	100
25	87	69	104	62	200	89	167	108	64	30	25	100
26	84	68	103	63	190	98	157	109	61	30	24	103
27	82	70	100	63	180	111	147	109	58	31	26	113
28	79	76	98	64	175	104	143	110	54	61	30	109
29	79	80	101	62	---	100	144	103	50	90	36	110
30	79	80	98	61	---	106	139	101	49	70	68	122
31	76	---	95	61	---	112	---	96	---	54	63	---
TOTAL	2607	2241	3478	2150	3585	3615	4025	3706	1984	1212	1116	3419
MEAN	84.1	74.7	112	69.4	128	117	134	120	66.1	39.1	36.0	114
MAX	106	82	154	90	225	170	177	161	90	90	68	258
MIN	72	67	82	61	66	89	90	86	49	28	24	51
CFSM	.64	.57	.85	.53	.97	.89	1.02	.91	.50	.30	.27	.86
IN.	.73	.63	.98	.61	1.01	1.02	1.13	1.04	.56	.34	.31	.96

CAL YR 1980 TOTAL 35991 MEAN 98.3 MAX 275 MIN 34 CFSM .75 IN 10.14
WTR YR 1981 TOTAL 33138 MEAN 90.8 MAX 258 MIN 24 CFSM .69 IN 9.34

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE¼ sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft (46 m) downstream from Kent Lake Dam, 2 mi (3 km) upstream from Woodruff Creek, and 3 mi (5 km) west of New Hudson.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft (264.566 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for periods of no gage-height record, Dec. 15 to Jan. 20 and Mar. 30 to May 8, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 111 ft³/s (3.144 m³/s), 10.18 in/yr (259 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Dec. 29, 1950, gage height, 5.05 ft (1.539 m), from rating curve extended above 600 ft³/s (17.0 m³/s); minimum, 2.6 ft³/s (0.074 m³/s) May 27, 1963, gage height, 0.53 ft (0.162 m); minimum daily, 6.4 ft³/s (0.18 m³/s) May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 270 ft³/s (7.65 m³/s) Nov. 7, gage height, 2.64 ft (0.805 m); maximum gage height, 2.73 ft (0.832 m) Sept. 6; minimum daily, 29 ft³/s (0.821 m³/s) Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	126	138	109	105	86	200	90	140	101	64	63	80
2	133	118	120	100	90	190	70	135	94	61	55	82
3	129	169	125	100	87	185	40	130	89	57	51	83
4	127	195	123	95	85	180	60	125	86	56	45	198
5	124	146	120	90	83	180	90	120	82	66	41	250
6	121	121	119	90	84	171	65	115	76	58	35	261
7	119	190	127	90	83	164	50	110	70	53	31	235
8	115	197	143	85	85	156	80	105	73	47	34	204
9	112	145	156	85	100	151	85	92	84	46	43	179
10	106	127	157	80	102	147	60	111	79	49	39	156
11	103	147	153	80	97	142	90	141	75	44	36	143
12	99	140	148	80	94	138	100	144	76	37	31	134
13	97	121	143	80	95	135	110	142	89	38	31	121
14	100	116	140	75	104	130	75	141	102	37	34	115
15	102	111	135	75	128	127	120	145	106	32	50	104
16	100	109	135	75	170	128	130	151	102	32	55	98
17	100	109	130	75	203	125	120	157	95	32	46	101
18	101	105	130	75	219	120	115	146	87	31	42	97
19	101	102	130	75	224	117	115	134	84	32	37	88
20	138	99	125	75	244	114	120	123	77	35	33	85
21	143	97	125	74	263	113	130	118	76	40	32	87
22	122	98	120	74	268	112	135	114	95	38	34	108
23	109	98	120	74	259	110	140	111	93	36	33	108
24	103	99	120	74	240	106	140	110	89	33	33	107
25	105	99	115	75	229	104	135	111	85	30	33	108
26	100	101	115	76	220	107	140	110	80	32	29	108
27	146	103	115	77	215	116	145	114	74	32	31	113
28	181	104	110	78	210	114	150	112	69	66	36	114
29	135	105	110	77	---	108	150	107	66	84	47	112
30	189	106	110	77	---	100	145	111	69	83	76	125
31	178	---	110	76	---	95	---	106	---	73	82	---
TOTAL	3764	3715	3938	2517	4367	4185	3195	3831	2523	1454	1298	3904
MEAN	121	124	127	81.2	156	135	107	124	84.1	46.9	41.9	130
MAX	189	197	157	105	268	200	150	157	106	84	82	261
MIN	97	97	109	74	83	95	40	92	66	30	29	80
CFSM	.82	.84	.86	.55	1.05	.91	.72	.84	.57	.32	.28	.88
IN.	.95	.93	.99	.63	1.10	1.05	.80	.96	.63	.37	.33	.98

CAL YR 1980 TOTAL 42106 MEAN 115 MAX 248 MIN 27 CFSM .78 IN 10.58
WTR YR 1981 TOTAL 38691 MEAN 106 MAX 268 MIN 29 CFSM .72 IN 9.72

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi (1.8 km) north of Hamburg, and 3 mi (5 km) upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi^2 (798 km^2).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft (259.080 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Kent Lake, 11 mi (18 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 208 ft^3/s (5.891 m^3/s), 9.17 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft^3/s (44.2 m^3/s) May 15, 1956; maximum gage height, 8.46 ft (2.579 m) June 30, 1968; minimum discharge, 32 ft^3/s (0.91 m^3/s) July 2, 3, 1965; minimum gage height, 3.16 ft (0.963 m) Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 707 ft^3/s (20.0 m^3/s) Feb. 25, gage height, 6.29 ft (1.917 m); minimum, 69 ft^3/s (1.95 m^3/s) July 19; minimum gage height, 3.67 ft (1.119 m) Jan. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	239	268	168	180	140	562	208	322	217	129	154	153
2	235	246	193	175	145	512	204	311	205	127	140	160
3	234	209	210	175	145	467	167	294	192	123	127	166
4	228	218	223	170	140	430	167	277	184	118	117	291
5	221	258	220	170	140	397	186	265	173	115	109	383
6	213	253	220	165	145	367	195	256	167	114	101	450
7	207	218	232	160	145	342	170	241	155	110	92	486
8	202	231	264	160	150	321	161	228	149	104	87	488
9	192	273	300	160	150	301	174	213	157	98	90	449
10	185	267	326	155	155	284	164	222	164	94	91	400
11	175	228	332	150	160	270	176	280	159	92	91	349
12	166	220	327	150	165	261	199	316	154	87	87	305
13	156	218	318	145	170	255	213	334	163	82	82	272
14	152	203	306	145	175	247	236	338	203	79	79	249
15	157	188	289	145	185	240	262	342	233	74	84	226
16	162	175	273	145	195	237	287	349	237	72	92	210
17	166	169	255	140	222	233	296	350	228	72	94	209
18	167	165	245	140	250	226	281	351	213	70	91	206
19	167	158	225	140	319	218	255	335	199	69	86	196
20	165	150	215	140	428	211	247	311	187	71	79	185
21	190	148	210	140	549	205	270	284	173	76	75	178
22	212	143	205	140	623	201	282	266	185	79	73	197
23	201	143	200	140	663	200	312	249	200	80	73	213
24	182	144	195	140	689	199	313	238	197	79	72	218
25	180	147	195	140	704	197	292	238	191	75	72	215
26	177	145	195	137	692	200	298	235	178	73	72	211
27	168	149	190	134	658	219	305	235	161	73	72	217
28	193	156	190	136	615	228	310	236	147	94	75	212
29	239	162	185	134	---	229	322	232	136	143	83	208
30	239	165	185	135	---	233	326	231	130	165	114	221
31	243	---	180	135	---	217	---	229	---	164	142	---
TOTAL	6013	5817	7271	4621	8917	8709	7278	8608	5437	3001	2896	7923
MEAN	194	194	235	149	318	281	243	278	181	96.8	93.4	264
MAX	243	273	332	180	704	562	326	351	237	165	154	488
MIN	152	143	168	134	140	197	161	213	130	69	72	153
CFSM	.63	.63	.76	.48	1.03	.91	.79	.90	.59	.31	.30	.86
IN.	.73	.70	.88	.56	1.08	1.05	.88	1.04	.66	.36	.35	.96

CAL YR 1980 TOTAL 83748 MEAN 229 MAX 567 MIN 84 CFSM .74 IN 10.11
WTR YR 1981 TOTAL 76491 MEAN 210 MAX 704 MIN 69 CFSM .68 IN 9.24

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW¼ sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft (4 m) downstream from bridge on Parker Road, 2.5 mi (4.0 km) south of Dexter, and 4 mi (6 km) upstream from mouth.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF RECORD.--February 1952 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft). Prior to May 23, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Nov. 5 to Dec. 11 and Jan. 16 to Feb. 24, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 78.6 ft³/s (2.226 m³/s), 8.34 in/yr (212 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 26, 1968, gage height, 12.95 ft (3.947 m); minimum, 7.3 ft³/s (0.21 m³/s) Dec. 13, 1963; minimum gage height, 4.94 ft (1.506 m) Dec. 13, 1963, Feb. 22, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 19	unknown	*939	26.6	*11.03	3.362	Apr. 12	2000	517	14.6	9.44	2.877
Feb. 23	unknown	660	18.7	unknown		Apr. 14	1900	578	16.4	9.71	2.960

Minimum discharge, 24 ft³/s (0.68 m³/s) Aug. 26, 27; minimum gage height, 5.43 ft (1.655 m) July 19, Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	56	54	75	39	37	187	135	135	111	45	63	44
2	62	51	110	39	37	164	116	119	88	45	52	40
3	63	50	100	39	37	141	102	106	86	43	49	78
4	61	49	75	38	37	131	116	95	129	48	49	325
5	57	47	68	38	37	122	123	88	102	45	44	409
6	54	47	65	38	37	113	105	84	80	42	40	272
7	53	47	120	38	38	101	93	76	67	39	38	176
8	50	47	180	38	38	95	84	71	60	37	38	131
9	48	45	220	38	39	95	93	68	63	36	39	98
10	47	44	180	38	40	98	92	112	58	35	37	77
11	46	44	142	38	41	97	207	302	51	32	35	66
12	45	43	115	38	42	95	448	270	48	32	33	57
13	44	43	102	38	43	97	448	177	86	33	33	51
14	43	44	84	37	45	88	495	157	223	31	31	67
15	45	45	71	37	80	87	429	247	295	30	32	67
16	47	45	62	37	150	89	271	253	192	30	38	58
17	49	44	56	37	250	84	208	177	132	29	33	83
18	55	44	50	37	450	77	184	141	103	29	30	94
19	53	43	47	37	800	71	161	119	86	28	29	79
20	52	43	45	37	650	69	151	103	78	40	28	65
21	50	42	43	37	550	70	131	90	71	50	28	56
22	48	42	40	37	400	70	118	80	113	44	27	190
23	47	42	40	37	600	71	268	73	113	37	26	167
24	48	42	40	37	500	71	255	71	88	34	26	118
25	70	41	40	37	372	71	190	76	79	32	25	89
26	70	43	40	37	286	91	154	69	68	38	25	79
27	63	50	39	37	217	146	137	110	59	38	26	118
28	61	60	39	37	200	125	127	123	53	141	29	115
29	63	68	39	37	---	115	166	93	49	209	34	88
30	59	64	39	37	---	125	156	155	46	136	69	180
31	56	---	39	37	---	151	---	155	---	84	59	---
TOTAL	1665	1413	2405	1163	6053	3207	5763	3995	2877	1572	1145	3537
MEAN	53.7	47.1	77.6	37.5	216	103	192	129	95.9	50.7	36.9	118
MAX	70	68	220	39	800	187	495	302	295	209	69	409
MIN	43	41	39	37	37	69	84	68	46	28	25	40
CFSM	.42	.37	.61	.29	1.69	.81	1.50	1.01	.75	.40	.29	.92
IN.	.48	.41	.70	.34	1.76	.93	1.67	1.16	.84	.46	.33	1.03

CAL YR 1980 TOTAL 33015 MEAN 90.2 MAX 708 MIN 22 CFSM .71 IN 9.59
WTR YR 1981 TOTAL 34795 MEAN 95.3 MAX 800 MIN 25 CFSM .75 IN 10.11

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42"17'10", long 83°44'00", in NW¼ sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft (30 m) upstream from bridge on Wall Street in Ann Arbor, 0.7 mi (1.1 km) downstream from Argo Dam, and 4.2 mi (6.8 km) upstream from Geddes Dam.

DRAINAGE AREA.--729 mi^2 (1,888 km^2).

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.-- WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft (227.018 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi (6.8 km) downstream, and January 1914 to September 1947, at Barton Dam, 2.6 mi (4.2 km) upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations above station. Since 1975 extensive regulation of flow exists due to automation of gates at dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--77 years, 453 ft^3/s (12.83 m^3/s), 8.44 in/yr (214 mm/yr), adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft^3/s (165 m^3/s), Mar. 14, 1918; minimum daily, 4 ft^3/s (0.11 m^3/s) Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,110 ft^3/s (88.1 m^3/s) July 4, gage height, 15.91 ft (4.849 m); minimum daily discharge, 45 ft^3/s (1.27 m^3/s) July 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	525	392	360	365	316	1440	814	675	575	259	229	219
2	588	458	455	385	310	1330	621	734	449	232	240	185
3	470	602	500	350	312	1200	374	725	454	257	270	415
4	485	484	475	355	306	1080	415	547	470	221	250	1100
5	495	395	450	360	292	938	502	562	445	184	238	1190
6	455	405	450	340	278	919	533	633	345	255	192	852
7	375	410	552	350	316	876	582	558	331	188	175	843
8	420	410	726	365	322	821	510	513	332	197	185	1000
9	430	410	858	340	309	777	518	509	439	228	146	680
10	425	405	834	332	309	743	490	614	325	180	126	574
11	405	395	750	332	358	643	543	935	313	154	159	567
12	400	400	720	345	358	644	732	981	290	150	142	652
13	375	415	696	312	384	638	1010	864	414	152	136	439
14	276	430	654	320	363	621	1140	970	639	128	131	506
15	365	558	630	301	341	601	1210	1170	723	182	148	461
16	324	612	618	311	398	567	972	1060	630	191	149	317
17	360	425	552	316	520	574	870	888	523	45	148	378
18	375	316	525	310	1210	550	864	834	442	59	126	566
19	430	336	475	293	1900	517	836	788	461	97	121	361
20	405	355	430	298	1910	418	800	759	412	193	122	328
21	248	370	420	279	1870	494	764	630	411	130	112	357
22	360	365	400	290	1750	488	730	635	467	138	104	463
23	400	340	400	309	1960	479	810	597	505	151	112	569
24	425	355	380	270	2230	478	981	575	422	120	111	441
25	430	340	395	299	1980	467	898	553	388	118	107	407
26	405	336	400	302	1770	524	837	526	294	149	101	398
27	445	336	360	311	1620	570	800	532	322	125	104	534
28	405	365	365	297	1510	576	740	577	297	382	116	518
29	390	375	380	309	---	569	836	515	306	522	218	368
30	395	370	370	246	---	586	835	632	233	268	262	438
31	400	---	370	277	---	567	---	681	---	275	247	---
TOTAL	12686	12165	15950	9869	25502	21695	22567	21772	12657	5930	5027	16126
MEAN	409	406	515	318	911	700	752	702	422	191	162	538
MAX	588	612	858	385	2230	1440	1210	1170	723	522	270	1190
MIN	248	316	360	246	278	418	374	509	233	45	101	185
MEAN+	428	423	530	334	927	717	769	720	441	216	184	558
CFSM+	.59	.58	.73	.46	1.27	.98	1.05	.99	.60	.30	.25	.77
IN+	.68	.65	.84	.53	1.32	1.13	1.18	1.14	.68	.34	.29	.85

CAL YR 1980 TOTAL 195702 MEAN 535 MAX 1710 MIN 98 MEAN+ 554 CFSM+ .76 IN+ 10.34
WTR YR 1981 TOTAL 181946 MEAN 498 MAX 2230 MIN 45 MEAN+ 517 CFSM+ .71 IN+ 9.63

+Adjusted for diversion for municipal supply; record furnished by City of Ann Arbor.

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW¼ sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft (9 m) downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi (7.9 km) downstream from Geddes Dam, 5.6 mi (9.0 km) upstream from Ford Dam, and at mile 42.8 (68.9 km).

DRAINAGE AREA.--807 mi² (2,090 km²).

PERIOD OF RECORD.--June 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 5 ft).

REMARKS.--Records good. Considerable regulation caused by many dams above station; storage capacity is small.

AVERAGE DISCHARGE.--7 years, 559 ft³/s (15.83 m³/s), 9.41 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,300 ft³/s (122 m³/s) Mar. 5, 1976, gage height, 12.50 ft (3.810 m); minimum daily, 64 ft³/s (1.81 m³/s) Sept. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,480 ft³/s (98.6 m³/s) Feb. 24, gage height, 11.90 ft (3.627 m); minimum daily, 72 ft³/s (2.04 m³/s) July 17; minimum gage height, 6.81 ft (2.076 m) Dec. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	629	429	424	420	353	1470	899	800	680	331	274	281
2	677	563	579	411	351	1360	724	860	520	324	297	234
3	544	645	648	361	281	1250	456	840	600	343	306	554
4	556	614	607	382	304	1160	461	640	556	339	311	1620
5	523	474	579	423	309	1020	565	623	541	228	278	1480
6	520	471	563	371	312	982	581	731	428	375	257	1080
7	433	479	700	363	321	946	641	664	384	274	231	924
8	435	477	884	359	318	886	602	580	408	200	233	1140
9	491	475	1090	358	311	848	592	525	519	324	199	840
10	488	470	1020	361	336	821	570	697	430	227	164	710
11	438	461	900	362	471	705	692	1010	383	216	219	638
12	449	469	848	372	390	703	860	1110	357	195	170	731
13	423	476	803	340	382	719	1120	984	531	205	180	622
14	342	484	763	338	396	694	1430	1120	806	158	185	598
15	357	652	739	340	431	665	1350	1320	866	195	211	552
16	366	696	746	331	511	649	1140	1230	748	304	214	389
17	376	552	655	322	829	613	1020	1040	619	72	173	475
18	435	333	618	319	1730	618	983	918	554	92	179	673
19	489	279	585	326	2440	586	968	858	527	122	145	458
20	441	339	486	328	2230	464	903	852	545	324	169	391
21	322	373	486	324	2030	535	863	708	473	228	153	409
22	315	372	459	320	1870	549	829	746	658	173	143	695
23	439	376	448	327	2120	554	1080	692	589	193	137	702
24	446	377	452	309	2370	516	1170	575	622	182	176	557
25	514	361	417	336	1890	552	1060	648	429	150	134	484
26	498	361	430	343	1770	623	957	590	462	251	139	485
27	444	376	411	336	1620	684	907	675	368	155	166	666
28	460	434	385	340	1530	654	870	675	372	599	156	597
29	416	426	435	332	---	654	957	631	359	598	233	470
30	436	413	430	282	---	668	970	774	327	383	548	584
31	442	---	422	301	---	623	---	812	---	351	317	---
TOTAL	14144	13707	19012	10737	28206	23771	26220	24928	15661	8111	6697	20039
MEAN	456	457	613	346	1007	767	874	804	522	262	216	668
MAX	677	696	1090	423	2440	1470	1430	1320	866	599	548	1620
MIN	315	279	385	282	281	464	456	525	327	72	134	234
CFSM	.57	.57	.76	.43	1.25	.95	1.08	1.00	.65	.33	.27	.83
IN.	.65	.63	.88	.49	1.30	1.10	1.21	1.15	.72	.37	.31	.92

CAL YR 1980 TOTAL 220825 MEAN 603 MAX 1980 MIN 152 CFSM .75 IN 10.18
WTR YR 1981 TOTAL 211233 MEAN 579 MAX 2440 MIN 72 CFSM .72 IN 9.74

04175340 STONY CREEK AT OAKVILLE, MI

LOCATION.--Lat 42°05'05", long 83°34'43", in SE¼ SE¼ sec.34, T.4 N., R.7 E., Washtenaw County, Hydrologic Unit 04100001, on left bank at downstream side of bridge on Tuttle Hill Road, 300 ft (91 m) downstream from Paint Creek, and 0.2 mi (0.3 km) northeast of Oakville.

DRAINAGE AREA.--68.0 mi^2 (176.1 km^2).

PERIOD OF RECORD.--January 1970 to September 1981 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map (nearest 5 ft). Prior to July 31, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 47.0 ft^3/s (1.331 m^3/s), 9.39 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 865 ft^3/s (24.5 m^3/s) Feb. 19, 1981, gage height, 8.25 ft (2.515 m); maximum gage height, 8.31 ft (2.533 m) Feb. 20, 1971, backwater from ice; minimum discharge, 2.7 ft^3/s (0.076 m^3/s) Aug. 24, 1971, gage height, 1.00 ft (0.305 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft^3/s (8.50 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 19	0700	*865	24.5	*8.25	2.515	July 21	2000	371	10.5	6.84	2.085
Feb. 23	1900	478	13.5	7.29	2.222	July 29	0300	531	15.0	7.47	2.277
Apr. 15	0200	408	11.6	7.04	2.146	Sept. 4	2100	680	19.3	7.97	2.429
June 4	1500	404	11.4	6.97	2.124	Sept. 22	2000	371	10.5	6.96	2.121

Minimum discharge, 7.4 ft^3/s (0.21 m^3/s) July 18, 19, gage height, 1.41 ft (0.430 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	23	25	15	16	122	38	86	67	16	43	36
2	16	22	40	15	15	103	32	67	48	16	34	41
3	16	22	41	15	15	83	30	54	69	14	30	55
4	15	22	29	15	15	76	30	46	318	18	28	492
5	15	20	26	14	15	75	29	39	153	16	23	588
6	14	18	26	14	15	67	26	36	79	13	20	301
7	14	19	50	14	15	58	25	33	51	11	19	141
8	14	19	118	14	15	54	24	30	40	11	17	92
9	13	19	145	14	15	57	26	29	52	10	17	64
10	13	18	84	14	15	60	25	36	44	12	16	48
11	13	17	54	14	16	58	56	81	33	9.8	15	38
12	14	16	42	14	17	52	117	69	29	8.9	14	33
13	14	17	39	14	18	51	108	47	69	9.6	14	29
14	14	19	33	14	20	43	250	51	226	9.3	14	36
15	16	21	29	14	40	43	294	140	154	7.9	19	36
16	18	19	25	14	70	40	123	132	80	8.7	21	42
17	17	17	21	14	140	38	108	76	57	8.2	17	104
18	19	18	19	14	380	35	109	56	42	8.1	14	108
19	19	17	18	14	805	32	78	44	34	8.7	13	71
20	20	17	17	14	652	32	66	38	33	117	12	50
21	19	17	16	14	486	32	53	33	29	290	14	39
22	18	16	15	14	312	32	48	30	58	208	11	266
23	19	16	15	14	408	32	138	27	69	70	12	213
24	19	17	15	15	387	32	126	26	50	44	10	93
25	28	17	15	15	224	30	80	26	33	32	11	66
26	25	16	15	15	158	33	61	37	25	48	12	58
27	21	17	15	16	121	58	54	103	21	50	11	56
28	22	27	15	16	124	42	53	88	19	230	13	47
29	28	28	15	16	---	39	213	56	17	393	14	38
30	25	26	15	16	---	40	126	133	16	120	78	126
31	24	---	15	16	---	46	---	128	---	63	45	---
TOTAL	555	577	1047	451	4529	1595	2546	1877	2015	1881.2	631	3407
MEAN	17.9	19.2	33.8	14.5	162	51.5	84.9	60.5	67.2	60.7	20.4	114
MAX	28	28	145	16	805	122	294	140	318	393	78	588
MIN	13	16	15	14	15	30	24	26	16	7.9	10	29
CFSM	.26	.28	.50	.21	2.38	.76	1.25	.89	.99	.89	.30	1.68
IN.	.30	.32	.57	.25	2.48	.87	1.39	1.03	1.10	1.03	.35	1.86

CAL YR 1980 TOTAL 20419.4 MEAN 55.8 MAX 566 MIN 8.2 CFSM .82 IN 11.17
WTR YR 1981 TOTAL 21111.2 MEAN 57.8 MAX 805 MIN 7.9 CFSM .85 IN 11.55

04175600 RIVER RAISIN NEAR MANCHESTER, MI

LOCATION.--Lat 42°10'05", long 84°04'34", in NE¼ SE¼ sec.33, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, on left bank 8 ft (2 m) downstream from bridge on Sharon Valley Road, and 2.5 mi (4.0 km) northwest of Manchester.

DRAINAGE AREA.--132 mi (342 km^2).

PERIOD OF RECORD.--January 1970 to September 1981 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 30, 1970, nonrecording age at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, June 19 to Aug. 24, which are poor. Occasional regulation by many dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 104 ft^3/s (2.945 m^3/s), 10.70 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 565 ft^3/s (16.0 m^3/s) Mar. 5, 1976, gage height, 6.46 ft (1.969 m); minimum, 4.5 ft^3/s (0.13 m^3/s) Nov. 29, 1971; minimum gage height, 1.16 ft (0.354 m) Oct. 12, Nov. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 280 ft^3/s (7.93 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Feb. 20	1700	*381	10.8	*5.57	1.698
June 15	0800	288	8.16	4.95	1.509

Minimum daily discharge, 46 ft^3/s (1.30 m^3/s) Nov. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	77	75	72	64	273	140	197	220	85	240	101
2	81	70	106	72	62	264	131	187	209	76	230	89
3	83	68	122	71	62	253	114	176	197	76	210	97
4	76	69	113	70	61	243	116	166	204	77	200	162
5	70	67	102	70	61	233	126	158	204	78	185	185
6	64	63	100	70	60	223	111	150	192	78	175	167
7	60	62	118	69	60	211	99	141	172	78	160	142
8	58	61	166	68	60	200	90	133	157	79	145	125
9	55	60	198	67	60	192	95	132	155	80	135	114
10	52	59	195	67	60	188	93	148	150	80	125	105
11	51	53	177	66	61	181	138	208	139	77	120	97
12	51	51	156	66	62	171	210	217	129	75	115	92
13	48	50	147	66	65	168	230	201	142	73	110	87
14	47	54	136	65	75	155	244	151	218	70	105	142
15	49	61	123	65	90	149	242	146	281	68	100	180
16	51	58	118	64	110	144	223	158	258	68	95	145
17	53	51	110	64	158	135	205	231	222	69	92	149
18	63	51	100	63	277	125	197	236	190	70	89	166
19	66	49	97	63	371	118	182	217	170	75	88	154
20	64	47	94	62	366	114	179	210	170	100	84	133
21	61	47	90	62	340	113	164	210	170	190	77	117
22	58	48	87	62	309	114	155	200	170	170	72	176
23	54	47	84	62	322	109	182	200	160	150	65	196
24	55	49	80	62	332	110	203	200	160	140	60	179
25	74	49	78	63	317	105	195	190	150	135	54	157
26	84	46	76	63	299	111	176	180	130	130	50	143
27	80	47	75	64	283	132	162	190	110	170	51	156
28	78	59	75	65	276	131	155	210	100	190	61	161
29	82	68	74	66	---	127	181	230	95	230	69	149
30	80	71	74	67	---	130	199	250	90	260	116	181
31	79	---	73	66	---	143	---	230	---	250	116	---
TOTAL	1998	1712	3419	2042	4723	5065	4937	5853	5114	3547	3594	4247
MEAN	64.5	57.1	110	65.9	169	163	165	189	170	114	116	142
MAX	84	77	198	72	371	273	244	250	281	260	240	196
MIN	47	46	73	62	60	105	90	132	90	68	50	87
CFSM	.49	.43	.83	.50	1.28	1.24	1.25	1.43	1.29	.86	.88	1.08
IN.	.56	.48	.96	.58	1.33	1.43	1.39	1.65	1.44	1.00	1.01	1.20

CAL YR 1980 TOTAL 43616 MEAN 119 MAX 334 MIN 38 CFSM .90 IN 12.29
WTR YR 1981 TOTAL 46251 MEAN 127 MAX 371 MIN 46 CFSM .96 IN 13.03

04176500 RIVER RAISIN NEAR MONROE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi (1.3 km) downstream from bridge on Ida Maybee Road, 5.0 mi (8.0 km) downstream from Saline River, and 7.5 mi (12.1 km) west of Monroe.

DRAINAGE AREA.--1,042 mi² (2,699 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft (187.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1953, at site 9 mi (14 km) downstream at datum 46.26 ft (14.100 m) lower.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968.

AVERAGE DISCHARGE.--44 years, 709 ft³/s (20.08 m³/s), 9.24 in/yr (235 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,500 ft³/s (411 m³/s) Sept. 6, 1981, gage height, 10.22 ft (3.115 m); maximum gage height, 10.7 ft (3.26 m) Feb. 1, 1949, backwater from ice, site and datum then in use; minimum discharge, about 2 ft³/s (0.06 m³/s) Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft³/s)	(m³/s)	(ft)	(m)			(ft³/s)	(m³/s)	(ft)	(m)
Feb. 20	2000	8680	246	9.15	2.789	July 29	0900	4060	115	6.60	2.012
June 15	0500	3880	110	6.47	1.972	Sept. 6	2000	*14500	411	*10.22	3.115

Minimum discharge, 108 ft³/s (3.06 m³/s) Aug. 29, gage height, 2.13 ft (0.649 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	317	305	310	305	280	2920	546	2110	772	702	2540	437
2	303	303	354	305	280	2450	525	2020	850	628	2220	467
3	292	298	384	300	280	2060	493	1790	873	513	1540	496
4	286	294	454	300	280	1730	485	1390	1140	510	1020	3620
5	284	288	510	300	280	1520	457	1070	1150	500	802	8190
6	286	291	504	295	280	1360	428	886	1090	461	689	12500
7	280	289	541	295	280	1210	410	761	935	424	594	12000
8	273	277	998	295	280	1080	396	679	764	379	527	7660
9	269	267	1760	295	280	996	389	608	735	342	475	5080
10	261	258	1810	290	280	951	377	574	1010	322	436	3030
11	240	252	1800	290	290	931	380	634	1290	300	411	1800
12	229	249	1670	290	320	893	445	766	1250	279	388	1220
13	225	268	1400	290	350	853	639	807	1140	252	360	952
14	236	264	1080	285	380	771	1930	837	3030	237	347	928
15	224	248	880	285	600	726	2870	1300	3590	224	330	1010
16	225	239	748	285	841	682	2890	1760	2990	212	317	992
17	230	245	612	280	1610	643	2980	1750	2970	201	310	1130
18	227	250	560	280	2830	615	2590	1590	3010	189	300	1420
19	228	248	450	280	4060	584	1910	1310	2600	183	272	1510
20	229	253	400	280	6390	565	1460	1040	1870	479	254	1410
21	235	256	350	275	8280	541	1210	857	1230	1530	239	1170
22	237	245	320	275	8250	523	971	722	1130	1900	221	1850
23	238	244	320	275	7660	506	984	632	1160	1430	212	1820
24	238	246	320	275	6890	493	1150	572	1110	1100	203	1660
25	243	249	315	275	5850	480	1160	529	1210	704	198	1500
26	246	246	315	275	4980	488	1090	496	1590	728	194	1250
27	271	253	310	275	4100	501	948	502	1800	1220	194	1050
28	300	265	310	275	3380	515	932	509	1780	2420	205	1080
29	314	278	310	275	---	531	1940	541	1430	3910	164	1160
30	288	297	310	275	---	541	2080	575	936	3180	283	1600
31	298	---	305	275	---	545	---	678	---	2830	379	---
TOTAL	8052	7965	20710	8850	69861	29204	35065	30295	46435	28289	16624	79992
MEAN	260	266	668	285	2495	942	1169	977	1548	913	536	2666
MAX	317	305	1810	305	8280	2920	2980	2110	3590	3910	2540	12500
MIN	224	239	305	275	280	480	377	496	735	183	164	437
CFSM	.25	.26	.64	.27	2.39	.90	1.12	.94	1.49	.88	.51	2.56
IN.	.29	.28	.74	.32	2.49	1.04	1.25	1.08	1.66	1.01	.59	2.86

CAL YR 1980 TOTAL 327284 MEAN 894 MAX 4990 MIN 215 CFSM .86 IN 11.68
WTR YR 1981 TOTAL 381342 MEAN 1045 MAX 12500 MIN 164 CFSM 1.00 IN 13.61

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981 (discontinued).
WATER TEMPERATURES: March 1966 to September 1972, April 1978 to September 1981 (discontinued).
SUSPENDED SEDIMENT DISCHARGE: March 1966 to September 1972.

INSTRUMENTATION.--Water-quality monitor Mar. 23 to July 13, 1981.

REMARKS.--Prior to Mar. 23. 1981, daily specific conductance and water temperature records are based on once-daily measurements by a local observer between 1500 and 1900 hours. Depth-integrated monthly samples are collected as a cross-section sample at gaging station or at bridge .8 mi (1.3 km) upstream on Ida Maybee Road.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16, 1979; minimum daily recorded (water years 1978-81), 263 micromhos Jan. 25, 1981.
WATER TEMPERATURES: Maximum daily recorded (water years 1967, 1970-1972, 1978-80), 32.0° C July 18, 1972; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily 1,430 mg/L Dec. 22, 1967; minimum daily, 1 mg/L on several days in 1969 and 1970.
SEDIMENT LOADS: Maximum daily, 28,000 tons (25,400 tonnes) Dec. 22, 1967; minimum daily, 0.29 ton (0.26 tonne) Aug. 31, 1971.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 06...	1415	284	771	8.4	12.5	13.0	123	220	380	330	78	98
NOV 20...	1000	251	936	8.3	2.5	18.2	--	K28	K11	340	100	100
JAN 20...	1400	278	749	7.9	.5	12.6	89	K130	K47	330	70	94
MAR 23...	1230	502	682	8.1	6.0	13.8	112	K8	K80	320	90	91
MAY 18...	1345	1630	666	8.1	13.0	10.0	95	E380	180	300	95	87
JUL 13...	1430	265	647	7.9	26.0	8.9	110	240	700	320	82	92
SEP 21...	1315	1140	560	7.8	15.0	9.4	94	K100	K1400	280	67	85

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 06...	21	20	11	.5	4.7	3.3	300	4	253	1.9	85
NOV 20...	23	26	13	.6	18	13	310	0	254	2.3	150
JAN 20...	23	21	12	.5	3.3	2.5	330	0	271	6.4	88
MAR 23...	22	16	10	.4	3.1	2.3	280	0	230	3.6	79
MAY 18...	20	12	8	.3	3.2	2.4	250	0	205	3.3	53
JUL 13...	21	18	11	.4	3.1	2.3	290	0	238	5.8	62
SEP 21...	17	11	8	.3	3.7	--	260	0	213	6.5	43

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)
OCT											
06...	1415	3	2	100	70	3	3	20	<10	0	0
JAN											
20...	1400	2	2	100	60	<1	<1	10	10	0	0
MAR											
23...	1230	0	0	100	0	0	0	10	10	0	0
JUL											
13...	1430	2	2	100	60	1	<1	10	<10	4	1
SEP											
21...	1315	3	2	100	100	1	1	20	10	3	1

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)
OCT										
06...	3	3	570	0	1	1	50	7	<.1	<.1
JAN										
20...	2	1	260	<10	0	0	40	40	<.1	<.1
MAR										
23...	3	2	400	20	3	3	50	40	<.1	<.1
JUL										
13...	9	4	820	<10	4	1	90	2	<.1	<.1
SEP										
21...	10	3	1800	30	4	3	80	10	.1	<.1

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)
OCT										
06...	5	4	0	0	0	0	20	--	5.7	1.0
JAN										
20...	5	5	0	0	0	0	20	5	1.5	--
MAR										
23...	8	6	0	0	0	0	130	10	--	--
JUL										
13...	7	--	1	0	0	0	40	6	7.1	.8
SEP										
21...	8	5	<1	<1	<1	<1	60	10	8.1	.8

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)
OCT											
06...	36	.3	6.5	462	429	354	1.2	1.2	.020	.040	.05
NOV											
20...	42	.3	3.3	559	511	379	.98	.98	--	.130	.17
JAN											
20...	41	.3	9.3	498	443	374	1.5	1.5	.640	.610	.79
MAR											
23...	34	.2	6.0	470	398	637	2.0	2.0	.130	.110	.14
MAY											
18...	33	.2	6.3	409	367	1800	6.1	5.8	.130	.110	.14
JUL											
13...	32	.3	8.2	462	384	331	1.1	1.1	.040	.020	.03
SEP											
21...	29	.2	8.2	350	335	1080	2.8	2.6	.070	.060	.08

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
06...	.68	.70	1.9	8.4	.170	.52	.100	6.7	14	11	100
NOV											
20...	--	.55	1.5	6.8	.130	.40	.100	5.4	4	2.7	100
JAN											
20...	.32	.96	2.5	11	.150	.46	.120	--	13	9.8	100
MAR											
23...	.50	.63	2.6	12	.090	.28	.070	--	8	11	100
MAY											
18...	.81	.94	7.0	31	.170	.52	.060	8.2	59	260	100
JUL											
13...	.93	.97	2.1	9.2	.110	.34	.060	7.9	34	24	100
SEP											
21...	1.0	1.10	3.9	17	.130	.40	.060	8.9	40	123	100

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 20,80	MAR 23,81	MAY 18,81	JUL 13,81	SEP 21,81
TIME	1000	1230	1345	1430	1315
TOTAL CELLS/ML	270	1100	4200	19000	1300
DIVERSITY: DIVISION	0.5	1.1	1.4	1.4	1.5
.CLASS	0.5	1.1	1.4	1.5	1.5
..ORDER	1.5	1.4	2.2	1.6	1.6
...FAMILY	2.0	1.6	3.2	2.4	1.7
....GENUS	2.0	1.6	3.4	3.2	2.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	28	1	*	0	--	-
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	--	-	--	-	750#	18	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	3100#	16	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	540	3	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	13	1	140	3	--	-	41	3
....KIRCHNERIELLA	--	-	--	-	28	1	630	3	--	-
....OOCYSTIS	--	-	--	-	--	-	450	2	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	990	5	--	-
....COELASTRUM	--	-	--	-	--	-	360	2	--	-
....CRUCIGENIA	--	-	--	-	--	-	720	4	120	9
....SCENEDESMUS	--	-	--	-	280	7	900	5	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	13	5	780#	71	110	3	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	--	-	41	3
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	130#	48	--	-	1000#	24	6700#	34	160	12
....MELOSIRA	--	-	--	-	56	1	2800	14	160	12
....STEPHANODISCUS	--	-	90	8	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	56	1	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	28	1	*	0	--	-
...DIATOMACEAE										
....DIATOMA	--	-	13	1	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	77	7	--	-	--	-	--	-
....SYNEDRA	26	10	--	-	28	1	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	28	1	--	-	--	-
...NAVICULACEAE										
....NAVICULA	77#	29	51	5	360	9	180	1	--	-
...NITZSCHIACEAE										
....NITZSCHIA	13	5	13	1	560	13	270	1	--	-
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	56	1	--	-	--	-
....SURIRELLA	--	-	--	-	140	3	--	-	--	-
.CHRYSOPHYCEAE										
..OCHROMONADALES										
...DINOBRYACEAE										
....STENOCALYX	--	-	--	-	28	1	--	-	--	-
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	*	0	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	28	1	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	540	3	41	3

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 20,80 1000		MAR 23,81 1230		MAY 18,81 1345		JUL 13,81 1430		SEP 21,81 1315	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	13	5	--	-	110	3	630	3	--	-
..NOSTOCALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	100	12
....APHANIZOMENON	--	-	--	-	--	-	--	-	610#	45
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	340	8	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	*	0	--	-
....PHACUS	--	-	--	-	--	-	*	0	--	-
....TRACHELOMONAS	--	-	64	6	--	-	100	1	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	770	717	793	577	377	597						
2	760	717	793	557	536	597						
3	680	735	825	524	346	597						
4	680	735	809	384	478	631						
5	687	735	790	491	663	631						
6	685	735	727	550	726	633						
7	685	737	727	475	---	633						
8	690	716	751	452	531	633						
9	680	714	758	442	727	630						
10	753	726	748	484	777	664						
11	769	728	736	568	779	670						
12	725	728	728	591	781	677						
13	694	738	695	628	781	680						
14	822	727	719	653	771	655						
15	826	727	339	618	777	653						
16	786	726	518	359	625	656						
17	717	726	528	701	625	659						
18	719	828	553	850	420	659						
19	719	821	552	759	357	654						
20	723	785	532	268	355	657						
21	723	768	529	362	352	662						
22	727	777	668	310	354	---						
23	834	729	531	682	470	---						
24	795	712	525	---	470	---						
25	795	708	562	263	472	---						
26	795	717	418	420	526	---						
27	813	729	683	424	526	---						
28	818	719	473	364	526	---						
29	813	793	550	712	---	---						
30	761	793	540	568	---	---						
31	738	---	568	424	---	---						
MEAN	766	761	622									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	628	624	626	642	622	633
2				---	---	---	627	625	626	620	592	601
3				---	---	---	626	623	625	595	565	578
4				---	---	---	627	622	625	605	566	593
5				---	---	---	619	616	618	621	603	610
6				---	---	---	615	613	614	645	618	628
7				---	---	---	612	610	611	654	626	642
8				---	---	---	610	606	608	687	647	662
9				---	---	---	607	603	605	673	665	670
10				---	---	---	605	602	604	672	631	643
11				---	---	---	602	597	601	640	632	637
12				---	---	---	599	596	597	656	644	651
13				---	---	---	614	592	599	659	655	657
14				---	---	---	862	613	728	677	661	669
15				---	---	---	644	619	627	671	660	664
16				---	---	---	645	623	636	633	662	664
17				---	---	---	629	598	616	668	662	666
18				---	---	---	622	583	594	667	658	663
19				---	---	---	624	601	610	668	654	660
20				---	---	---	645	612	628	669	658	664
21				---	---	---	659	633	643	677	664	671
22				---	---	---	663	630	642	665	640	653
23				644	642	643	674	654	666	644	638	642
24				643	641	642	668	654	658	648	637	643
25				641	639	640	659	646	651	656	640	647
26				638	635	637	642	624	631	661	645	650
27				635	632	633	635	618	627	658	632	641
28				630	628	629	746	632	654	637	629	633
29				630	627	628	674	635	641	643	631	637
30				628	627	627	637	626	630	647	633	640
31				627	625	626	---	---	---	634	629	631
MONTH							862	583	628	687	565	643

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	646	528	637	580	570	575						
2	639	629	635	589	579	584						
3	704	612	642	606	588	601						
4	624	614	618	624	610	618						
5	631	615	623	634	624	630						
6	611	602	605	642	632	640						
7	600	592	595	650	638	647						
8	596	591	594	663	647	656						
9	632	599	618	---	---	---						
10	597	590	593	---	---	---						
11	595	589	593	---	---	---						
12	587	581	584	---	---	---						
13	857	577	642	---	---	---						
14	732	618	679	---	---	---						
15	633	614	626	---	---	---						
16	633	605	612	---	---	---						
17	622	590	611	---	---	---						
18	597	534	562	---	---	---						
19	531	515	520	---	---	---						
20	516	511	513	---	---	---						
21	529	515	523	---	---	---						
22	558	528	546	---	---	---						
23	561	554	556	---	---	---						
24	573	559	567	---	---	---						
25	586	574	581	---	---	---						
26	586	582	584	---	---	---						
27	589	578	581	---	---	---						
28	587	574	579	---	---	---						
29	581	569	574	---	---	---						
30	572	570	571	---	---	---						
31	---	---	---	---	---	---						
MONTH	857	511	594									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20.5	9.5	1.0	.0	.0	3.0						
2	18.5	8.0	1.5	.0	.0	3.5						
3	14.5	12.0	1.0	.0	.0	4.0						
4	13.0	8.5	2.0	.0	.0	4.0						
5	12.5	9.0	3.0	.0	.0	2.0						
6	12.0	8.0	6.5	.0	.0	3.5						
7	13.5	8.5	7.0	.0	.0	4.0						
8	17.5	8.0	5.0	.0	.0	4.0						
9	---	10.0	5.0	.0	.0	5.0						
10	13.0	6.0	3.0	.0	.0	4.5						
11	11.5	5.0	1.0	.0	.0	2.0						
12	10.0	5.0	4.0	.0	.0	---						
13	10.0	9.0	1.0	.0	.5	3.5						
14	11.5	8.0	1.5	.0	1.5	5.0						
15	12.0	8.5	1.0	.0	1.5	5.0						
16	15.0	4.0	.0	.0	3.0	4.5						
17	12.0	4.0	.0	.0	.0	3.0						
18	10.5	3.0	.0	.0	4.5	2.0						
19	10.0	4.5	.0	.0	4.0	1.5						
20	10.0	4.0	.0	.0	4.5	3.5						
21	10.5	5.0	.0	.0	3.5	4.0						
22	10.0	5.0	.0	.0	3.0	---						
23	9.5	5.0	.0	.0	3.0	---						
24	8.0	4.5	.0	.0	3.5	---						
25	4.5	3.0	.0	.0	3.5	---						
26	5.0	4.5	.0	1.0	3.5	---						
27	5.0	3.0	.0	.5	3.5	---						
28	5.5	3.0	.0	1.0	3.5	---						
29	6.0	4.0	.0	.5	---	---						
30	7.5	3.5	.0	.5	---	---						
31	9.0	---	.0	1.5	---	---						
MEAN		6.0	1.5	.0	1.5							

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	14.5	12.5	13.0	13.5	12.5	13.0
2				---	---	---	14.5	12.0	13.0	14.0	12.5	13.0
3				---	---	---	14.0	13.0	13.5	14.5	12.5	13.5
4				---	---	---	14.5	13.5	14.0	16.0	13.5	14.5
5				---	---	---	13.5	11.0	12.5	16.0	15.0	15.5
6				---	---	---	13.0	10.0	11.5	16.0	14.5	15.0
7				---	---	---	13.5	10.5	11.5	16.0	14.0	15.0
8				---	---	---	14.5	11.5	13.0	16.5	14.0	15.0
9				---	---	---	16.0	13.0	14.5	15.5	15.0	15.5
10				---	---	---	16.0	13.5	14.5	15.5	14.0	15.0
11				---	---	---	16.0	14.0	15.0	14.0	12.5	13.5
12				---	---	---	14.5	13.0	14.0	14.5	12.0	13.0
13				---	---	---	13.0	12.0	12.5	15.0	13.0	14.0
14				---	---	---	13.0	12.0	12.5	14.5	12.5	13.5
15				---	---	---	12.0	11.0	11.5	12.5	11.0	11.5
16				---	---	---	12.0	10.5	11.5	13.0	11.0	12.0
17				---	---	---	13.5	12.0	12.5	14.0	12.5	13.0
18				---	---	---	14.5	13.0	13.5	13.0	12.5	12.5
19				---	---	---	14.0	13.0	13.5	13.5	11.5	12.5
20				---	---	---	14.0	12.5	13.0	15.0	12.0	13.5
21				---	---	---	13.0	11.5	12.5	16.5	13.5	15.0
22				---	---	---	12.5	11.5	12.0	18.0	15.0	16.5
23				7.0	6.0	6.5	14.0	12.0	13.0	18.0	16.5	17.5
24				8.0	6.0	7.0	13.0	11.0	12.5	19.0	17.0	18.0
25				9.0	6.5	7.5	11.0	10.5	11.0	20.5	18.0	19.0
26				7.5	7.0	7.0	11.0	10.0	11.0	21.0	19.5	20.0
27				9.5	6.5	8.0	13.0	10.5	12.0	20.5	19.0	19.5
28				10.5	8.0	9.0	13.5	12.0	13.0	20.0	18.5	19.5
29				12.0	9.5	10.5	13.5	12.0	12.5	20.5	18.5	19.5
30				12.5	11.5	11.5	13.0	11.5	12.0	20.0	19.0	19.5
31				14.0	11.0	12.5	---	---	---	20.0	18.0	19.0
MONTH							16.0	10.0	12.5	21.0	11.0	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.5	17.5	18.5	22.0	21.0	21.5						
2	19.5	18.0	18.5	23.0	21.0	22.0						
3	20.0	18.5	19.0	23.5	22.0	22.5						
4	20.5	18.5	19.5	24.5	22.5	23.0						
5	21.0	19.5	20.0	25.0	23.0	24.0						
6	22.0	20.0	21.0	25.5	23.5	24.5						
7	22.5	20.0	21.0	26.5	24.0	25.0						
8	22.5	20.5	21.5	28.0	25.0	26.0						
9	22.0	20.5	21.5	28.5	25.5	27.0						
10	22.0	20.5	21.0	28.5	25.5	26.5						
11	21.0	20.0	20.5	28.5	25.0	26.5						
12	20.5	19.5	20.0	29.0	25.5	26.5						
13	20.0	19.5	20.0	27.5	25.5	26.5						
14	20.5	19.0	19.5	---	---	---						
15	22.0	20.5	21.0	---	---	---						
16	22.0	21.5	21.5	---	---	---						
17	22.0	20.5	21.5	---	---	---						
18	22.5	21.0	22.0	---	---	---						
19	22.0	21.0	22.0	---	---	---						
20	21.5	20.0	21.0	---	---	---						
21	22.5	20.0	21.0	---	---	---						
22	22.0	21.0	21.5	---	---	---						
23	21.5	20.0	21.0	---	---	---						
24	21.5	20.5	21.0	---	---	---						
25	22.5	21.0	21.5	---	---	---						
26	21.5	20.0	21.0	---	---	---						
27	21.0	19.5	20.5	---	---	---						
28	21.0	19.5	20.0	---	---	---						
29	22.0	19.5	21.0	---	---	---						
30	22.0	21.0	21.5	---	---	---						
31	---	---	---	---	---	---						
MONTH	22.5	17.5	20.5									

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited stream-flow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are useable in low-flow or floodway analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1981

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Superior				
*04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec. 23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73†, 1974-79c, 1980-81	10-07-80 04-02-81 08-19-81 09-22-81	222 b1,830 69.3 44.6
04044559	Peterson Creek near Sands, MI	Lat 46°24'21", long 87°20'38", in SW¼SW¼ sec. 5, T.46 N., R.24 W., Marquette County, 150 ft downstream from old bridge crossing, 500 ft upstream from mouth and 3.2 miles southeast of Sands.	7.24	1979-81	10-01-80 05-13-81 07-14-81	2.89 2.76 2.41
04044560	Big Creek near Sands, MI	Lat 46°24'43", long 87°19'57", in NW¼SE¼ sec. 5, T.46 N., R.24 W., Marquette County, at abandoned road crossing 0.7 mile downstream from mouth of Peterson Creek and 3.6 miles east of Sands.	14.4	1979-81	10-02-80 05-13-81 07-15-81	15.2 17.6 15.5
04044567	Big Creek near Beaver Grove, MI	Lat 46°27'55", long 87°19'07", in SE¼SW¼ sec. 16, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 1 mile upstream from mouth and 0.2 mile northwest of Beaver Grove.	24.0	1979-81	10-02-80 05-13-81 07-14-81	40.2 39.7 37.0
04044570	Cedar Creek near Sands, MI	Lat 46°26'11", long 87°24'20", in SW¼SW¼ sec. 26, T.47 N., R.25 W., Marquette County, at headwaters, 0.3 mile east of old County Road 553 and 1.2 miles north of Sands.	5.44	1979-81	10-01-80 05-13-81 07-14-81	.26 .24 .25
04044577	Cedar Creek near Beaver Grove, MI	Lat 46°28'23", long 87°19'46", in SE¼NE¼ sec. 17, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.7 mile upstream from mouth and 0.9 mile northwest of Beaver Grove.	10.6	1979-81	10-02-80 05-13-81 07-14-81	18.3 18.3 17.7
04044581	Cherry Creek near Sands, MI	Lat 46°27'47", long 87°23'31", in NW¼NE¼ sec. 23, T.47 N., R.25 W., Marquette County, about 600 ft north of County Road 480 and 3.1 miles northeast of Sands.	.33	1979-81	10-02-80 05-13-81 07-14-81	5.79 6.26 5.65
04044586	Cherry Creek near Beaver Grove, MI	Lat 46°28'45", long 87°20'18", in SE¼SW¼ sec. 8, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.8 mile upstream from mouth and 1.5 miles northwest of Beaver Grove.	5.07	1979-81	10-02-80 05-13-81 07-15-81	25.5 27.7 25.4
04044592	Silver Creek near Sands, MI	Lat 46°28'48", long 87°23'07", in SW¼SW¼ sec. 12, T.47 N., R.25 W., Marquette County, at double culvert on Silver Creek Road, 1.7 miles southwest of Harvey and 4.3 miles northwest of Sands.	4.88	1979-81	10-01-80 05-14-81 07-14-81	2.69 2.53 2.05
04044597	Silver Creek near Harvey, MI	Lat 46°29'22", long 87°20'16", in NE¼NW¼ sec. 8, T.47 N., R.24 W., Marquette County, at bridge on Lake Superior and Ishpeming Railroad, 300 ft northwest of overpass on State Highway 28 and 0.9 mile southeast of Harvey.	10.8	1979-81	10-01-80 05-13-81 07-14-81	8.82 9.16 8.08

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1981--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Measurements Date	Measurements Discharge (ft³/s)
04044610	Sand River at Sand River, MI	Lat 46°29'22", long 87°07'31", in NW¼NE¼ sec. 12, T.47 N., R.23 W., Marquette County, at bridge on Duluth South Shore and Atlantic Railroad, 1 mile upstream from mouth, and 0.5 mile west of the village of Sand River.	29.5	1980-81	10-14-80 11-04-80 03-30-81 08-20-81	8.03 12.5 b206 2.29
04044744	Munising Falls Creek at Munising, MI	Lat 46°25'28", long 86°37'27", in NW¼SE¼ sec. 36, T.47 N., R.19 W., Alger County, at culvert, 0.3 mile upstream from mouth, at Munising.		1979-81	10-14-80 04-30-81 08-26-81	1.41 b3.56 1.01
04044750	Miners River near Van Meer, MI	Lat 46°25'12", long 86°31'23", in SE¼SW¼ sec. 35, T.47 N., R.18 W., Alger County, at culvert on County Road H-58, 2.5 miles west of Van Meer.		1979-81	10-15-80 04-30-81 08-26-81	5.51 b34.5 3.99
04044755	Miners River near Munising, MI	Lat 46°29'18", long 86°32'26", in SW¼NE¼ sec. 10, T.47 N., R.18 W., Alger County, at bridge on Pictured Rocks Trail road about 1 mile upstream from mouth and 7.5 miles northeast of Munising.		1979-81	10-15-80 04-07-81 04-30-81 08-26-81	15.1 b107 b76.1 12.6
04044762	Mosquito River near Melstrand, MI	Lat 46°31'07", long 86°28'41", in NW¼NE¼ sec. 31, T.48 N., R.17 W., Alger County, 150 ft downstream from confluence with tributary from west, downstream from Mosquito Falls and 4.7 miles northwest of Melstrand.		1979-81	10-14-80 04-28-81 08-25-81	6.80 b39.4 3.81
04044765	Chapel Creek near Melstrand, MI	Lat 46°32'54", long 86°26'20", in NE¼NW¼ sec. 21, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6 miles north of Melstrand.		1979-81	10-14-80 04-28-81 08-25-81	6.52 b21.5 2.12
04044766	Spray Creek near Melstrand, MI	Lat 46°33'27", long 86°24'38", in SE¼NE¼ sec. 15, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6.5 miles north of Melstrand.		1979-81	10-14-80 04-28-81 08-25-81	5.76 b10.5 3.41
04044770	Beaver Creek near Melstrand, MI	Lat 46°34'39", long 86°21'02", in NE¼NE¼ sec. 7, T.48 N., R.16 W., Alger County, 0.7 mile downstream from Beaver Lake, 200 ft upstream from mouth and 8 miles northeast of Melstrand.		1979-81	10-15-80 04-29-81 08-26-81	25.0 b39.8 18.3
04044775	Sevenmile Creek near Grand Marais, MI	Lat 46°37'15", long 86°15'31", in NW¼NW¼, sec. 25, T.49 N., R.16 W., Alger County, 100 ft upstream from mouth and 13.5 miles west of Grand Marais.		1979-81	10-16-80 04-29-81 08-27-81	16.2 b23.4 15.5
04044782	Sullivan Creek near Grand Marais, MI	Lat 46°39'19", long 86°11'02", in NW¼SE¼ sec. 9, T.49 N., R.15 W., Alger County, at culvert 200 ft upstream from mouth on County Road H-58 and 9.5 miles west of Grand Marais.		1979-81	10-14-80 04-28-81 08-25-81	5.10 b6.45 2.39
04044785	Hurricane River near Grand Marais, MI	Lat 46°39'48", long 86°09'57", in NW¼NE¼ sec. 10, T.49 N., R.15 W., Alger County, at culvert 0.2 mile upstream from mouth, on County Road H-58 and 8.5 miles west of Grand Marais.		1979-81	10-14-80 04-28-81 08-25-81	19.1 b29.8 9.50
04044786	Sable Creek near Grand Marais, MI	Lat 46°40'03", long 86°01'01", in SW¼SE¼ sec. 2, T.49 N., R.14 W., Alger County, 150 ft upstream from path leading to Sable Falls and 1.5 miles southwest of Grand Marais.		1979-81	10-14-80 04-07-81 04-28-81 08-25-81	8.68 b4.40 b30.0 7.32
		Streams tributary to Lake Michigan				
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼NW¼ sec. 10, T.41 N., R.21 W., Delta County, about 800 ft downstream from Chippeny Creek, 3.5 miles northeast of Rapid River.	284	1973-81	10-22-80 01-13-81 05-12-81 09-03-81	145 97.8 450 96.6
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec. 19, T.46 N., R.26 W., Marquette County, at bridge on County Highway 565, 4.5 miles south of Palmer.	d8.42	1961-65 1970-81	11-05-80 05-14-81 08-20-81 09-24-81	b6.15 b27.2 b15.9 b9.87
04058250	Warner Creek tributary near Palmer, MI	Lat 46°25'20", long 87°36'09", in NW¼SE¼ sec. 31, T.47 N., R.26 W., Marquette County, at double culvert on County Road 565, 0.3 mile upstream from mouth and 0.8 mile south of Palmer.	4.05	1972-81	05-14-81 08-20-81 09-24-81	b2.72 b2.06 b1.06
04058300	Warner Creek near Palmer, MI	Lat 46°24'09", long 87°32'39", in NW¼ sec. 10, T.46 N., R.26 W., Marquette County, 10 ft upstream from bridge on county highway, 0.1 mile upstream from confluence with Schweitzer Creek, and 3.5 miles southeast of Palmer.	14.2	1961-68† 1970-72d 1972-78† 1979-81	11-18-80 05-14-81 08-20-81 09-24-81	b6.98 b11.7 b7.73 b5.21

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1981--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04059034	Escanaba River near Wells, MI	Lat 45°48'22", long 87°05'51", in SW¼NW¼ sec. 1, T.39 N., R.23 W., Delta County, 600 ft downstream from Bichler Creek, 2.5 miles upstream from mouth and 2.0 miles northwest of Wells.	a920	1981	07-01-81	b1,120
					07-06-81	b931
					07-07-81	b847
					07-09-81	b585
					07-13-81	b463
					07-16-81	b437
					07-29-81	b432
					07-31-81	b381
					09-28-81	b280
04065580	Mounty's Creek near Merriman, MI	Lat 45°56'41", long 87°59'23", in SW¼SW¼ sec. 18, T.41 N., R.29 W., Dickinson County, 400 ft upstream from mouth, and 3.6 miles northeast of Merriman.	2.96	1971-81h	10-29-80	b6.68
					05-14-81	b10.3
					05-28-81	b8.08
					09-03-81	b4.46
04065590	Steel Creek near Merriman, MI	Lat 45°56'31", long 87°59'33", in NE¼NE¼ sec. 24, T.41 N., R.30 W., Dickinson County, 200 ft upstream from mouth, 3.6 miles northeast of Merriman.	3.52	1971-81	10-29-80	2.04
					05-28-81	3.02
					09-03-81	1.23
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼SW¼ sec. 7, T.6 S., R.4 W., Hillsdale County, at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-81	10-09-80	1.55
					11-18-80	3.40
					06-11-81	2.64
					08-18-81	3.97
04101700	Dowagiac Drain near Decatur, MI	Lat 42°04'26", long 86°01'51", in SW¼ sec. 35, T.4 S., R.15 W., Van Buren County, at bridge on 50th Street, 3.7 miles southwest of Decatur.	21.9	1962-64, 1980-81	10-15-80	b33.5
					12-01-80	b38.9
					01-05-81	35.1
					02-02-81	b39.8
					02-18-81	b168
					02-21-81	b132
					03-02-81	b52.1
					03-26-81	b36.7
					04-06-81	32.4
					05-11-81	b153
					06-08-81	b30.8
					07-06-81	30.5
					08-03-81	30.7
					09-14-81	24.0
04101710	Lake of the Woods Drain near Decatur, MI	Lat 42°05'05", long 86°02'17", in NE¼ sec. 34, T.4 S., R.15 W., Van Buren County, at culvert at 92nd Avenue, 3.5 miles southwest of Decatur.	13.1	1962-64, 1980-81	10-15-80	b9.50
					12-01-80	b13.0
					01-05-81	12.4
					02-02-81	b14.1
					02-18-81	b45.1
					03-02-81	b25.4
					04-06-81	11.6
					05-11-81	b51.3
					06-09-81	b11.3
					07-06-81	8.11
					08-03-81	b10.1
					09-14-81	6.51
04102148	South Branch Paw Paw River near Paw Paw, MI	Lat 42°12'02", long 85°54'05", in NE¼ sec. 23, T.3 S., R.14 W., Van Buren County, at 60th Avenue, 1.4 miles south of Paw Paw.	51.2	1980-81	10-14-80	b61.3
					12-01-80	b75.7
					01-05-81	58.8
					02-02-81	b68.0
					02-18-81	b239
					02-21-81	b164
					03-02-81	b88.4
					04-06-81	64.7
					05-12-81	b188
					06-09-81	b59.3
					07-07-81	44.3
					08-03-81	50.4
					09-14-81	41.9
04102178	East Branch Paw Paw River near Lawton, MI	Lat 42°41'50", long 85°50'33", in NW¼ sec. 21, T.3 S., R.13 W., Van Buren County, at 30th Street, 1.5 miles north of Lawton.	26.9	1966, 1980-81	10-14-80	b22.2
					12-01-80	b30.0
					01-06-81	b24.0
					02-02-81	b22.4
					03-02-81	b30.5
					04-06-81	24.3
					05-11-81	84.1
					06-09-81	b26.0
					07-06-81	19.1
					08-03-81	b22.3
					09-14-81	18.9

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1981--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04102180	East Branch Paw Paw River at Paw Paw, MI	Lat 42°12'45", long 85°53'15", in sec. 13, T.3 S., R.14 W., Van Buren County, at bridge on State Highway 40 at Paw Paw.	31.5	1962-64, 1980-81	10-14-80	b30.0
					12-01-80	b38.8
					01-06-81	b32.0
					02-03-81	b23.7
					02-18-81	b68.1
					03-03-81	b41.5
					04-07-81	33.5
					05-12-81	b114
					06-09-81	b35.6
					07-06-81	28.8
					08-04-81	b30.0
					09-14-81	27.1
04102192	South Branch Paw Paw River at Paw Paw, MI	Lat 42°14'06", long 85°53'10", in SE¼ sec. 1, T.3 S., R.14 W., Van Buren County- at 51st Avenue, 1.0 mile north of Paw Paw.	94.3	1980-81	10-15-80	b96.6
					12-02-80	b159
					01-07-81	b114
					02-03-81	b112
					03-03-81	b144
					04-07-81	110
					05-13-81	b182
					06-09-81	b118
					07-06-81	81.3
					08-04-81	b74.4
					09-15-81	73.8
04102212	North Branch Paw Paw River near Paw Paw, MI	Lat 42°16'39", long 85°51'48", in SW¼ sec. 20, T.2 S., R.13 W., Van Buren County, at bridge on 32nd Street, 4.3 miles northeast of Paw Paw.	37.8	1980-81	10-14-80	b48.9
					12-02-80	b89.4
					01-07-81	b59.6
					02-03-81	b37.8
					02-18-81	b225
					03-03-81	b66.6
					04-07-81	50.7
					05-12-81	b224
					06-09-81	b50.9
					07-07-81	45.1
					08-04-81	b51.3
					09-15-81	36.6
04102217	Unnamed tributary to North Branch Paw Paw River near Paw Paw, MI	Lat 42°15'48", long 85°51'49", in SW¼ sec. 29, T.2 S., R.13 W., Van Buren County, at 32nd Street, 3.5 miles northeast of Paw Paw.	17.6	1980-81	10-14-80	b13.2
					12-02-80	b20.2
					01-07-81	b11.8
					02-03-81	b14.0
					03-03-81	b14.4
					04-07-81	13.2
					05-12-81	b32.6
					06-10-81	b15.1
					07-07-81	12.5
					08-04-81	b11.8
					09-15-81	9.69
04102260	Brandywine Creek near Paw Paw, MI	Lat 42°16'50", long 85°53'53", in NE¼ sec. 23, T.2 S., R.14 W., Van Buren County, at bridge on 38th Avenue, 4.4 miles north of Paw Paw.	32.2	1962-64, 1980-81	10-14-80	b9.99
					12-02-80	b65.5
					01-08-81	b16.2
					02-03-81	b21.7
					02-19-81	b342
					03-03-81	b37.1
					04-07-81	15.1
					05-12-81	b167
					06-10-81	b12.5
					07-07-81	6.92
					08-05-81	5.12
					09-15-81	4.28
04102370	Brush Creek at Lawrence, MI	Lat 42°13'10", long 86°02'36", in SW¼ sec. 10, T.3 S., R.15 W., Van Buren County, at bridge on Red Arrow Highway at Lawrence.	39.9	1962-64, 1980-81	10-14-80	b25.0
					12-03-80	b51.2
					01-09-81	b27.6
					02-04-81	b36.9
					02-19-81	b162
					03-04-81	b42.4
					04-07-81	28.9
					05-13-81	b122
					06-10-81	b38.2
					07-07-81	24.5
					08-05-81	22.5
					09-16-81	b20.8

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1981--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
04102392	Paw Paw River at Lawrence, MI	Lat 42°13'26", long 86°03'06", in NE¼ sec. 9, T.3 S., R.15 W., Van Buren County, at 52nd Street in Lawrence.	265	1980-81	10-15-80	b240
					12-04-80	b327
					01-09-81	b310
					02-04-81	b293
					02-19-81	b1,300
					02-21-81	b1,280
					03-04-81	b469
					04-07-81	319
					05-12-81	b1,410
					05-16-81	b648
					06-10-81	b292
					07-08-81	204
					08-05-81	197
					09-16-81	b170
04102540	Brandywine Creek near Covert, MI	Lat 42°18'54", long 86°18'27", in NE¼ sec. 8, T.2 S., R.17 W., Van Buren County, at bridge on old U.S. Highway 31, 2.7 miles northwest of Covert.	16.7	1962-64, 1980-81	10-14-80	b6.25
					12-08-80	b100
					01-14-81	10.6
					02-06-81	12.8
					03-05-81	b21.4
					04-09-81	b39.3
					05-12-81	b156
					06-12-81	5.33
					07-07-81	2.77
					08-07-81	b2.57
					09-18-81	b2.00
04102545	Deerlick Creek near South Haven, MI	Lat 42°22'23", long 86°17'07", in NE¼ sec. 21, T.1 S., R.17 W., Van Buren County, at 76th Street, 2.0 miles south of South Haven.	7.76	1962-64, 1980-81	10-14-80	b1.65
					12-08-80	b111
					01-13-81	5.74
					02-06-81	6.42
					03-05-81	b8.23
					04-09-81	b21.7
					05-11-81	b156
					06-12-81	.51
					07-06-81	.23
					08-07-81	b.24
					09-18-81	bf.04
04102575	Black River Drain near Bangor, MI	Lat 42°20'40", long 86°03'12", in NW¼ sec. 34, T.1 S., R.15 W., Van Buren County, above confluence with Haven and Max Lake Drain, 125 feet upstream from 52nd Road, 3.8 miles northeast of Bangor.	23.6	1962-64, 1980-81	10-14-80	b14.4
					12-04-80	b36.2
					01-12-81	23.3
					02-05-81	b27.2
					03-04-81	b43.7
					04-08-81	19.0
					05-12-81	bg381
					06-11-81	b15.8
					07-06-81	11.3
					08-06-81	9.07
					09-17-81	b9.59
04102590	Haven and Max Lake Drain near Bangor, MI	Lat 42°20'50", long 86°03'10", in SW¼ sec. 27, T.1 S., R.15 W., Van Buren County, at culvert on 20th Road, 4.0 miles northeast of Bangor.	16.8	1962-64, 1980-81	10-15-80	b11.4
					12-04-80	b20.1
					01-12-81	13.2
					02-05-81	b18.6
					03-04-81	b27.0
					04-08-81	12.6
					05-13-81	bf192
					05-15-81	b50.6
					06-11-81	b9.18
					07-06-81	5.45
					08-06-81	b5.02
					09-17-81	b4.52
04102618	Black River at Bangor, MI	Lat 42°18'56", long 86°06'48", in NE¼ sec. 12, T.2 S., R.16 W., Van Buren County, at bridge on Railroad Street at Bangor.	52.4	1980-81	10-15-80	b40.9
					12-05-80	b77.5
					01-12-81	49.0
					02-05-81	b65.0
					02-20-81	b480
					03-04-81	b95.7
					04-08-81	55.8
					05-13-81	b370
					06-11-81	b37.1
					07-06-81	29.4
					08-06-81	24.1
					09-17-81	b23.8

Discharge measurements made at low-flow partial-record stations during water year 1981--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements Date	Measurements Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04102720	Cedar Creek near South Haven, MI	Lat 42°21'15", long 86°11'17", in NW¼ sec. 29, T.1 S., R.16 W., Van Buren County, at bridge on 16th Street, 4.6 miles southeast of South Haven.	17.6	1962-64, 1980-81	10-15-80	b9.43
					12-05-80	b21.8
					01-13-81	14.4
					02-05-81	b18.1
					02-20-81	b151
					03-05-81	b26.0
					04-09-81	b30.3
					05-13-81	b97.9
					06-12-81	6.38
					07-06-81	4.22
					07-07-81	b5.01
					09-17-81	b3.18
04102731	Black River near South Haven, MI	Lat 42°25'10", long 86°14'24", in NW¼ sec. 1, T.1 S., R.17 W., Van Buren County, at 71.5 Street, 1.0 mile east of South Haven.	132	1980-81	10-15-80	b119
					12-08-80	b381
					02-20-81	b1,430
					02-21-81	b1,130
					03-05-81	b233
					04-09-81	b203
					05-12-81	b1,480
					05-15-81	b577
					06-12-81	124
					07-07-81	60.1
					08-07-81	b54.9
04114594	Maple River near St. Johns, MI	Lat 43°02'43", long 84°28'11", in SE¼ SE¼ sec. 30, T.8 N., R.1 W., Clinton County, at bridge on Colony Road, and 4.5 miles northeast of St. Johns.		1981	06-10-81	b49.1
					06-19-81	57.0
					07-21-81	20.9
					08-25-81	11.8
04115450	Fish Creek at Carson City, MI	Lat 43°10'40", long 84°51'24", in SW¼ sec. 12, T.9 N., R.5 W., Montcalm County, on downstream side of footbridge in park, 300 ft upstream of bridge on State Highway 57, at Carson City.	126	1974-81	04-07-81	84.3
					06-17-81	b156
					08-26-81	23.0
04119061	Plaster Creek at Wyoming, MI	Lat 42°56'15", long 85°41'24", NE¼ sec. 2, T.6 N., R.12 W., Kent County, at Godfrey St., at Wyoming.	57.1	1974-81	10-27-80	b27.2
					12-22-81	19.9
					04-06-81	28.8
					08-24-81	14.6
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼NW¼ sec. 1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	a39	1974-81	10-28-80	57.3
					07-22-81	35.1
					08-25-81	29.7
04126755	Platte River at M-22 near Honor, MI	Lat 44°42'39", long 86°07'08", in NE¼SE¼ sec. 28, T.27 N., R.15 W., Benzie County, at bridge on State Highway 22, 0.4 mile downstream from Platte Lake and 6.2 miles northwest of Honor.	166	1946-48 1957 1979-81	10-14-80	be136
					11-04-80	e141
					12-09-80	e155
					01-13-81	e147
					02-23-81	be175
					03-10-81	e174
					04-14-81	be189
					05-05-81	b192
					05-12-81	e174
04126758	Platte River at Weir on Loon Lake Outlet near Honor, MI	Lat 44°43'12", long 86°08'12", in SW¼SW¼ sec. 21, T.27 N., R.15 W., Benzie County, at Department of Natural Resources fish weir, 0.6 mile downstream of Loon Lake and 7.2 miles northwest of Honor.	169	1979-81	05-05-81	b209
04126767	Otter Creek at Aral Road near Empire, MI	Lat 44°45'42", long 86°04'26", in SW¼SW¼ sec. 1, T.27 N., R.15 W., Benzie County, at culverts on Aral Road, 0.1 mile upstream from mouth and 3.5 miles south of Empire.	9.55	1979-81	05-07-81	13.6
04126802	Crystal River near Glen Arbor, MI	Lat 44°54'10", long 85°57'46", in SE¼NE¼ sec. 23, T.29 N., R.14 W., Leelanau County, at culverts on County Highway 675, 3.7 miles upstream from mouth and 1.4 miles east of Glen Arbor.	42.0	1979-81	05-05-81	b78.0
04126810	Shalda Creek near Glen Arbor, MI	Lat 44°56'48", long 85°53'07", in SE¼NW¼ sec. 4, T.29 N., R.13 W., Leelanau County, at culverts on Lake Michigan Road, 0.1 mile upstream from mouth and 6.2 miles northeast of Glen Arbor.	33.8	1979-81	05-05-81	b37.1

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1981--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	 Dischar (ft^3/s
		Streams tributary to Lake Huron				
04146450	North Branch Flint River near Columbiaville, MI	Lat 43°11'18", long 83°22'03", in NW¼ sec. 24, T.9 N., R.9 E., Lapeer County, on downstream side of bridge on Barnes Lake Road.	--	1979-81	11-05-80 07-08-81 08-12-81 09-09-81	71.9 41.8 b154 b701
		Streams tributary to St. Clair River				
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec. 9, T.5 N., R.16 E., St. Clair County, at bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-81	10-22-80 11-26-80 07-28-81 09-02-81	12.2 6.8 b3.9 b27.0

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* Also a crest-stage station.
† Operated as a continuous-record gaging station.
a Approximately.
b Not base flow.
c Operated as a crest-stage partial-record station.
d Since 1970, affected by diversion for industrial use.
e Discharge measurement made by employees of Michigan Department of Natural Resources.
f Field estimate.
g Discharge includes the flow in Haven and Max Lake Drain.
h Since Mar. 1976, affected by diversion into basin by industry.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information of some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1981

					Annual maximum		
Station No.	Station Name	Location	Drainage area (mi^2)	Period of record	Date	Gage height (feet)	Dis-charge (ft^3/s)
		Streams tributary to Lake Superior					
*04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec.23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73‡ 1974-81	04-01-81	a10.64	2,170
04039500	South Branch Ontonagon River at Ewen, MI	Lat 46°31'58", long 89°16'37", in NW¼ sec.26, T.48 N., R.40 W., Ontonagon County, on piers of old State Highway 28 bridge, at Ewen.	348	1939-41 1942-71‡ 1972-81	04-01-81	14.38	3,690
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15‡ 1957-81	04-26-79 04-04-81	10.22 9.16	b703 363
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, at bridge on Highway 41A, at Ishpeming.	16.5	1970-81	06-16-81	6.87	<185
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-81	04-05-81	6.52	1,650
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, at bridge on county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-81	04-04-81	7.98	734
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, at bridge on county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	31.9	1973-81	04-04-81	11.14	681
		Streams tributary to Lake Michigan					
04046000	Black River near Garnet, MI	Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, on right bank 10 ft upstream from foot bridge, 15 feet downstream from Peters Creek, 3.5 miles upstream from Lake Michigan and 4 miles southwest of Garnet.	28.0	1951-78‡ 1979-81	04-04-81	4.96	209
04049500	Manistique River at Germfask, MI	Lat 46°14'00", long 85°55'40", in SE¼ sec.4, T.44 N., R.13 W., Schoolcraft County, 600 feet upstream from bridge on State Highway 77, 1.0 mile south of Germfask.	341	1938-70‡ 1971-81	04-05-81	5.25	1,220
04057000	Indian River near Manistique, MI	Lat 45°59'30", long 86°17'15", in NE¼ sec.34, T.42 N., R.16 W., Schoolcraft County, at outlet of Indian Lake, 2.4 miles northwest of Manistique.	302	1938-71‡ 1972-81	06-15-81	c4.95	710
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, at bridge on county road, 4.4 miles east of Republic.	34.4	1961-68‡ 1970-81	05-31-70 05-05-72 09-12-78 04-25-79 05-06-81	4.79 4.78 5.26 5.07 3.58	b484 b482 b590 b545 261
04059400	Tenmile Creek at Perronville, MI	Lat 45°48'38", long 87°22'00", in NW¼ NW¼ sec.2, T.39 N., R.25 W., Delta County, 1 mile northwest of Perronville.	38.4	1971-77‡ 1978-81	--	<4.11	<308
04062200	Peshekee River near Champion, MI	Lat 46°33'25", long 88°00'09", in NW¼ sec.13, T.48 N., R.30 W., Marquette County, on left bank 10 feet downstream from bridge on County Road 607, 0.6 mile downstream from West Branch and 3.5 miles northwest of Champion.	133	1961-78‡ 1979-81	04-04-81	5.26	1,540

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1981--Continued

					Annual maximum		
Station No.	Station Name	Location	Drainage area (mi^2)	Period of record	Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued					
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec.18, T.46 N., R.29 W., Marquette County, on left bank 400 feet upstream from county highway bridge, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75‡ 1976-81	04-15-81	4.91	1,690
04096272	Beebe Creek near Hillsdale, MI	Lat 41°57'15", long 84°38'20", in NE¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, 20 feet upstream from bridge on Moore Road, 1.2 miles northwest of Hillsdale.	42.4	1975-78‡ 1979-81	02-20-81	6.45	370
04096340	St. Joseph River at Clarendon, MI	Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, on left bank 5 feet upstream from bridge on 22 Mile Road at Clarendon.	144	1975-77‡ 1978-81	02-24-81	d	e525
04097170	Portage River near Vicksburg, MI	Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, on right bank 15 feet upstream from bridge on W Ave., 2.4 miles east of Vicksburg.	68.2	1947-51‡ 1965-79‡ 1980-81	02-24-81	4.90	148
04098500	Fawn River near White Pigeon, MI	Lat 41°46'56", long 85°35'00", in SW¼ sec.10, T.8 S., R.11 W., St. Joseph County, on right bank 0.3 mile downstream from bridge on county highway, 3.1 miles east of White Pigeon, and 3.5 miles upstream from Sherman Mill Creek.	192	1958-75‡ 1976-81	07-31-81	5.26	532
04108645	Rabbit River at Hamilton, MI	Lat 42°40'31", long 86°00'13", in NE¼ sec.6, T.3 N., R.14 W., Allegan County, at bridge on State Highway 40, at Hamilton.	274	1979-81	05-12-81	16.89	2,250
04112700	Sycamore Creek near Mason, MI	Lat 42°36'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, at bridge on Harper Road, 0.7 mile downstream from Aurelius and VeVoy Drain, and 2.6 miles northwest of Mason.	39.5	1975-81	02-19-81	9.93	381
04113090	Carrier Creek near Grand Ledge, MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, at bridge on St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles southeast of Grand Ledge.	7.18	1975-81	05-11-81	6.37	170
04117000	Quaker Brook near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW¼ sec.13, T.2 N., R.7 W., Barry County, on left bank 150 feet upstream from culvert on county road, 500 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75‡ 1976-81	02-17-81	4.22	135
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE¼ sec.7, T.6 N., R.11 W., Kent County, on right downstream side of bridge on 28th Street, at Grand Rapids.	46.6	1974-81	05-12-81	>10.31	>1,080
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE¼ sec.18, T.6 N., R.12 W., Kent County, on right downstream side of bridge on Wilson Avenue, at Grandville.	50.5	1974-81	03-04-79 05-12-81	9.52 10.30	b1,180 1,580
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon.	f39	1974-81	02-19-81	3.32	198
04122025	Muskegon River at Bridgeton, MI	Lat 43°20'50", long 85°56'22", in SE¼ NE¼ sec.14, T.11 N., R.14 W., Newaygo County, at bridge on Warner Road, in Bridgeton.	--	1979-81	02-24-81	d	g5,500
04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 N., Oceana County, at culverts on county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	f78	1975-81	02-24-81	3.68	274
04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, at bridge on U.S. Highway 31, 3.5 miles northeast of Pentwater.	f44	1975-81	02-24-81	2.58	228

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1981--Continued

					Annual maximum		
Station No.	Station Name	Location	Drainage area (mi²)	Period of record	Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued					
04123500	Manistee River near Grayling, MI	Lat 44°41'35", long 84°50'50", in SW¼ NW¼ sec.31, T.27 N., R.4 W., Crawford County, on right bank 25 feet upstream from bridge on State Highway 72, 6.8 miles northwest of Grayling.	131	1942-73‡ 1974-81	04-09-81	0.93	227
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°31'02", in NE¼ NW¼ sec.28, T.20 N., R.10 W., Osceola County, 75 feet downstream from highway bridge, 3.0 miles west of Tustin.	b63	1953-63‡ 1964-81	04-29-81	4.04	196
*04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE¼ NE¼ sec.31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile Bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75‡ 1976-81	04-29-81	2.64	323
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, at bridge on U.S. Highway 31, 1.2 miles south of Benzonia.	f170	1975-81	04-04-81	3.78	892
04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW¼ SW¼ sec.5, T.32 N., R.5 W ., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	f65	1975-81	04-04-81	4.44	826
		Streams tributary to Lake Huron					
04131500	Rainy River near Ocqueoc, MI	Lat 45°24'30", long 84°10'45", in NE¼ NW¼ sec.22, T.35 N., R.2 E., Presque Isle County, at bridge on North Allis Highway, 4.4 miles west of Ocqueoc, and 5.0 miles upstream from Black Lake.	f85	1952-79‡ 1980-81	--	<3.80	<250
04132500	Thunder Bay River near Hillman, MI	Lat 45°00'30", long 83°58'21", in NE¼ SE¼ sec.8, T.30 N., R.4 E., Montmorency County, on left bank 25 feet upstream from bridge on State Highway 32, 5.2 miles southwest of Hillman.	232	1946-72‡ 1973-81	04-11-81	h7.13	522
04138000	East Branch Au Gres River at McIvor, MI	Lat 44°13'57", long 83°42'03", in NW¼ NW¼ sec.10, T.21 N., R.6 E., Iosco County, on right bank 25 feet downstream from bridge on Whittemore Road at McIvor, and 11.5 miles upstream from mouth.	f84	1950-73‡ 1974-81	02-19-81	i7.58	e540
04139000	Houghton Creek near Lupton, MI	Lat 44°23'45", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, 2.7 miles southwest of Lupton.	29.7	1950-72‡ 1973-81	04-09-81	5.77	381
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'46", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, at bridge on Campbell Road, 4.0 miles northwest of Selkirk.	7.51	1953-81	04-09-81	1.94	98
04141000	South Branch Shepards Creek near Selkirk, MI	Lat 44°18'28", long 84°05'13", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County on right bank 200 feet upstream from mouth, 600 feet west of bridge on Bedtelyon Road, and 1.1 miles southwest of Selkirk.	1.15	1951-78‡ 1979-81	04-10-81	3.58	73
04144180	Jones Creek near Gaines, MI	Lat 42°53'02", long 83°52'27", in SE¼ sec.28, T.6 N., R.5 E., Genesee County, at bridge on Baldwin Road, 1.7 miles northeast of Gaines.	7.60	1970-81	02-18-81	7.10	142
04144200	Porter Drain near Gaines, MI	Lat 42°53'26", long 83°50'59", in SE¼ sec.27, T.6 N., R.5 E., Genesee County, at bridge on Seymour Road, 3.2 miles east of Gaines.	4.68	1970-81	04-16-72 02-18-81	4.43 4.37	b79 77
04144220	Jones Creek at Duffield, MI	Lat 42°54'45", long 83°54'27", in SE¼ sec.17, T.6 N., R.5 E., Genesee County, at bridge on Grand Blanc Road, 1.0 mile south of Duffield.	23.4	1970-81	05-17-74 04-19-75 02-18-81	8.77 9.28 d	b429 b491 e300

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1981--Continued

					Annual maximum		
Station No.	Station	Location	Drainage area (mi^2)	Period of record	Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Huron--Continued					
04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SW¼ sec.29, T.8 N., R.10 E., Lapeer County, on downstream right wingwall of bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-81	02-19-81	8.12	766
04147800	Powers-Cullen Drain near Genesee, MI	Lat 43°05'33", long 83°33'51", in SW¼ sec.18, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.3 miles southeast of Genesee.	9.17	1970-81	09-04-81	3.93	260
04147900	Lefler-Scothan Drain near Otisville, MI	Lat 43°08'11", long 83°32'27", in NE¼ sec.5, T.8 N., R.8 E., Genesee County, at bridge on Frances Road, 2.2 miles south of Otisville.	4.90	1970-81	12-31-72 05-17-74 03-23-78 04-04-80 09-04-81	4.60 4.81 5.26 4.41 7.40	b95 b104 b79 b37 193
04148120	Kearsley Creek near Atlas, MI	Lat 42°57'15", long 83°32'42", in NE¼ sec.5, T.6 N., R.8 E., Genesee County, at bridge on Jordan Road, 1.2 miles north of Atlas.	55.6	1970-81	12-31-72 04-20-75 12-15-75 03-23-78 03-17-80 02-17-81	7.25 7.91 7.25 7.05 6.86 6.98	b450 b1,250 b450 b278 b180 282
04148130	Black Creek near Davison, MI	Lat 43°01'28", long 83°33'24", in SE¼ sec.7, T.7 N., R.8 E., Genesee County, at bridge on Irish Road, 2.0 miles west of Davison.	22.8	1970-81	09-05-81	7.94	314
04148144	Chipmunk Creek near Genesee, MI	Lat 43°04'01", long 83°36'59", in SE¼ sec.27, T.8 N., R.7 E., Genesee County, at culvert on Genesee Road, 3.1 miles south of Genesee.	5.49	1970-81	04-14-81	3.31	93
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec.15, T.5 N., R.7 E., Oakland County, on right bank 25 feet downstream from bridge on Elliot Road, 2.4 miles north of Holly.	12.1	1956-75‡ 1976-81	09-30-80 02-17-81	j2.93 2.81	-- 40
04148255	Swartz Creek near Grand Blanc, MI	Lat 42°53'09", long 83°41'29", in SE¼ sec.25, T.6 N., R.6 E., Genesee County, at bridge on Baldwin Road, 4.1 miles southwest of Grand Blanc.	36.0	1970-81	02-17-81	4.67	114
04148260	Swartz Creek near Swartz Creek, MI	Lat 43°58'22", long 83°45'43", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.9 miles east of Swartz Creek.	67.3	1970-81	03-15-71 04-17-72 12-31-72 05-17-74 02-17-81	7.70 7.70 9.57 9.09 8.03	b652 b652 b1,090 b975 725
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE¼ sec.14, T.6 N., R.5 E., Genesee County, at bridge on Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-81	02-17-81	6.07	195
04148270	West Branch Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°46'08", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.2 miles east of Swartz Creek.	40.6	1970-81	03-15-71 04-17-72 12-31-72 05-17-74 04-04-80 02-17-81	9.56 9.98 10.56 9.95 6.32 8.35	b660 b730 b1,150 b1,230 b398 740
04148410	Thread Creek near Goodrich, MI	Lat 42°53'19", long 83°32'10", in SE¼ sec.29, T.6 N., R.8 E., Genesee County, at bridge on Baldwin Road, 2.4 miles southwest of Goodrich.	28.8	1970-81	02-18-81	4.09	150
04148610	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW¼ sec.35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing.	8.51	1970-81	04-06-70 04-14-81	4.98 6.67	b83 215
04148620	Freeman Drain near Montrose, MI	Lat 43°07'04", long 83°53'37", in SE¼ sec.5, T.7 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose.	8.21	1970-81	04-21-70 05-11-81	3.40 6.07	b57 265
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE¼ sec.35, T.9 N., R.5 E., Genesee County, at bridge on Morrish Road, 4.1 miles southeast of Montrose.	11.9	1970-81	04-14-81	6.37	338
04148740	Central-Stadler Drain near Montrose, MI	Lat 43°09'46", long 83°50'14", in SE¼ sec.23, T.9 N., R.5 E., Genesee County, at bridge on Wilson Road, 3.1 miles east of Montrose.	15.09	1970-81	04-14-81	k4.58	170

See footnotes at end of table.

Annual Maximum discharge at crest-stage partial-record stations during water year 1981--Continued

Station No.	Station	Location	Drainage area (mi²)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04148800	Pine Run near Montrose, MI	Lat 43°12'42", long 83°48'54", in SE¼ sec.1, T.9 N., R.5 E., Genesee County, at bridge on Elms Road, 4.7 miles northeast of Montrose.	28.2	1970-81	02-18-81	8.75	645
04148900	Silver Creek near Clio, MI	Lat 43°12'54", long 83°45'55", in NW¼ sec.4, T.9 N., R.6 E., Genesee County, at bridge on Weir Road, 3.0 miles northwest of Clio.	3.70	1970-81	02-18-81	3.48	76
04149300	Misteguay Creek near Flushing, MI	Lat 43°01'31", long 83°54'41", in NE¼ sec.7, T.7 N., R.5 E., Genesee County, at bridge on Duffield Road, 3.7 miles southwest of Flushing.	17.3	1970-81	04-14-81	10.28	1,040
04151000	Cass River at Vassar, MI	Lat 43°22'15", long 83°34'52", in NW¼ SW¼ sec.7, T.11 N., R.8 E., Tuscola County, at bridge on State Highway 15, at Vassar.	710	1949-70‡ 1971-81	09-06-81	14.51	8,360
04153500	Salt River near North Bradley, MI	Lat 43°42'10", long 84°28'14", in NE¼ SE¼ sec.7, T.15 N., R.1 W., Midland County, at bridge on North Saginaw Road, 1.1 miles southeast of North Bradley.	138	1935-71‡ 1972-81	05-12-81	m11.24	1,240
		Streams tributary to St. Clair River					
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, on right downstream wingwall of bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-81	02-19-81	19.13	2,460
		Streams tributary to Lake St. Clair					
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75‡ 1976-81	09-05-81	3.39	193
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, at bridge on Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-81	02-23-81	13.81	e80
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, at bridge on State Highway 53, at Almont.	9.56	1959-62 1963-68‡ 1969-81	02-19-81	4.34	204
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, at bridge on 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64 1965-69‡ 1970-81	04-04-70 02-19-81	2.77 d	b293 e700
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, on left bank at bridge on 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67 1968-72‡ 1973-81	02-19-81	17.10	e1,100
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, at bridge on North Road, 3.4 miles south of Armada.	10.0	1959-65 1966-70‡ 1971-81	03-05-74 02-18-81	6.17 5.10	b430 288
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, at bridge on 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65 1966-70‡ 1971-81	02-23-81	15.18	580
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, at bridge on 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-67 1968-72‡ 1973-81	04-03-67 02-01-68 12-31-72 03-05-74 03-05-77 02-23-81	6.00 8.46 7.94 8.22 7.19 7.74	b1,070 b1,760 b1,150 b1,420 b300 966
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, at bridge on 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60 1961-65‡ 1966-81	02-19-81	6.73	336

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1981--Continued

					Annual maximum		
Station No.	Station	Location	Drainage area (mi^2)	Period of record	Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake St. Clair--Continued					
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, at bridge on 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64‡ 1965-81	02-22-81	7.81	119
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, at bridge on Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64 1965-69‡ 1971-81	02-17-81	9.72	551
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, 2.2 miles south of Waldenburg.	16.0	1959 1960-64‡ 1965-81	02-17-81	15.44	290
		Streams tributary to Detroit River					
04167000	Middle River Rouge near Garden City, MI	Lat 42°20'55", long 83°18'45", in SW¼ NW¼ sec.6, T.2 S., R.10 E., Wayne County, on right bank 200 feet downstream from bridge on Inkster Road, 1.8 miles northeast of Garden City.	99.9	1931-33‡ 1948-77‡ 1978-81	09-04-81	9.21	1,320
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, at bridge on King Road, at Trenton.	19.3	1972-81	05-16-81	8.46	345
		Streams tributary to Lake Erie					
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 82°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, on downstream side of culvert on White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-81	02-20-81	2.19	57
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-81	02-19-81	9.38	516
04175960	South Branch River Raisin near Adrian, MI	Lat 41°55'03", long 84°00'37", in SE¼ sec.25, T.6 S., R.3 E., Lenawee County, at Howell Highway, 2.0 miles northeast of Adrian.	165	1979-81	09-04-81	11.16	1,850
04176000	River Raisin near Adrian, MI	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, at Academy Road, 1.7 miles east of Adrian.	463	1954-78‡ 1979-81	09-04-81	14.28	4,460
04176400	Saline River near Saline, MI	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, on right bank 20 feet downstream from bridge on Maple Road, 2.8 miles south of Saline.	94.6	1966-77‡ 1978-81	02-19-81	10.89	1,210

‡ Operated as a continuous-record gaging station.
* Also a low-flow partial-record station.
a Maximum gage height, 10.84 ft, Mar. 31, 1981, backwater from ice.
b Revised.
c Maximum gage height, 5.52 ft, June 15, 1981, wind action on Indian Lake.
d Maximum stage not determined.
e Computed on basis of correlation with nearby stations.
f Approximately.
g Based on correlation with Muskegon River at Newago.
h Maximum gage height, 7.83 ft, Dec. 25, 1980, backwater from ice.
i Backwater from ice.
j Maximum gage height, stage rising, peak occurred Oct. 2, 1981.
k Maximum gage height, 5.56 ft, Feb. 18, 1981, backwater from ice.
m Maximum gage height, 14.30 ft, Feb. 19, 1981, backwater from ice.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk(*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1981

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Superior				
Plymouth Mine Pond Outlet	Alward Creek	Lat 46°28'14", long 89°58'56", in SE¼ NW¼ sec. 18, T.47 N., R.45 W., Gogebic County, at culvert on Plymouth Road, at Ramsay, MI.	--	1974-80	02-03-81 06-10-81	*1.41 *1.06
		Streams Tributary to Lake Michigan				
Goose Lake Outlet	East Branch Escanaba River	Lat 46°27'32", long 87°30'09", in NW¼ sec.24, T.47 N., R.26 W., Marquette County, 1,000 ft below outlet of Goose Lake, 4.5 miles east of Palmer, MI.	14.6	1952, 1962-70b 1976	10-01-80 06-10-81 08-24-81	*21.5 *15.5 *2.38
do	do	Lat 46°26'49", long 87°30'09", in NE¼ NW¼ sec.25, T.47 N., R.26 W., Marquette County, 4 miles east of Palmer, MI	20.5	1962-64, 1976	10-01-80 06-10-81 08-24-81	*11.4 *11.4 .93
do	do	Lat 46°25'58", long 87°30'36", in NW¼ sec.36, T.47 N., R.26 W., Marquette County, at bridge, 3.7 miles east of Palmer, MI.	21.8	1960-65b 1971, 1976	10-01-80 06-10-81 08-24-81	*10.7 *12.6 *.64
do	do	Lat 46°25'37", long 87°30'45", in NE¼ SE¼ sec.35, T.47 N., R.26 W., Marquette County, 3.7 miles east of Palmer, MI.	a24	--	06-10-81	*14.1
Unnamed Tributary	Goose Lake Outlet	Lat 46°25'16", long 87°30'30", in SW¼ SW¼ sec.36, T.47 N., R.26 W., Marquette County, at mouth, 4.0 miles east of Palmer, MI.	--	1976	10-01-80 06-11-81 08-24-81	†.15 †.20 †.09
Goose Lake Outlet	East Branch Escanaba River	Lat 46°25'14", long 87°30'26", in SW¼ SW¼ sec.36, T.47 N., R.26 W., Marquette County, below unnamed tributary, 4.2 miles southeast of Palmer, MI.	31.0	1961-64, 1976	10-01-80 06-11-81 08-24-81	‡15.5 ‡15.4 ‡2.38
do	do	Lat 46°24'37", long 87°30'30", in NW¼ SW¼ sec.1, T.46 N., R.26 W., Marquette County, 4.5 miles southeast of Palmer, MI.	32.8	1962-64, 1971, 1976	06-11-81 08-24-81	‡35.6 ‡9.15
do	do	Lat 46°24'04", long 87°30'06", in SE¼ NW¼ sec.12, T.46 N., R.26 W., Marquette County, 5 miles southwest of Sands Station, MI.	36.0	1962-64, 1976	06-11-81 08-24-81	‡36.9 ‡10.8
Skunk Creek	East Branch Sturgeon River	Lat 46°01'51", long 87°49'46", in SE¼ SE¼ sec.17, T.42 N., R.28 W., Dickinson County, 0.3 mile upstream from mouth, 2.2 miles north of Felch, MI.	14.5	1973-76, 1978-80	04-07-81 06-10-81	45.4 100
Dowagiac Drain	Dowagiac River	Lat 42°05'10", long 85°58'26", in SW¼ sec.29, T.4 S., R.14 W., Van Buren County, at bridge on 44th Street, 1.0 mile south of Decatur, MI.	14.3	1980	04-24-80 10-15-80 03-26-81 04-06-81 05-11-81 06-08-81 07-06-81 08-03-81 09-14-81	27.0 21.1 26.0 *20.8 113 23.2 *16.7 21.4 *15.3
Osborne Drain	do	Lat 42°04'26", long 86°01'51", in SW¼ sec.35, T.4 S., R.15 W., Van Buren County, at culvert on 56th Street, 5.0 miles southeast of Keeler, MI.	15.5	1962-64, 1980	04-24-80 05-19-80 10-15-80 05-12-81 07-06-81	10.0 11.0 5.42 28.6 *6.10
Sucker Creek	Pipestone Creek	Lat 42°01'45", long 86°22'40", in SE¼ SE¼ sec.15, T.5 S., R.18 W., Berrien County, at bridge on Dutch Lane Road, 1.5 miles southeast of Sodus, MI.	--	--	07-13-81	c.28

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams Tributary to Lake Michigan--Continued				
Sucker Creek	Pipestone Creek	Lat 42°02'36", long 86°22'50", in SE¼ SE¼ sec.10, T.5 S., R.18 W., Berrien County, at bridge on Naomi Road, 0.5 mi west of Sodus, Mi.	--	--	07-13-81	c1.5
Eagle Lake Drain	Gates Drain	Lat 42°10'18", long 85°55'00", in NW¼ NW¼ sec.35, T.3 S., R.14 W., Van Buren County, at bridge at intersection of 38th Street and 68th Avenue, 3.5 miles west of Lawton, MI.	14.3	1980	04-23-80 04-24-80 10-14-80 05-12-81 07-07-81	18.8 21.7 15.5 38.8 *15.8
Gates Drain	South Branch Paw Paw River	Lat 42°10'18", long 85°54'30", in NW¼ sec.35, T.3 S., R.14 W., Van Buren County, at bridge on 68th Street, 3.0 miles west of Lawton, MI.	40.4	1962-64 1980	04-24-80 10-14-80 05-12-81 07-07-81	72.9 29.3 131 *42.0
East Branch Paw Paw River	do	Lat 42°40'30", long 85°47'22", in SE¼ sec.26, T.3 S., R.13 W., Van Buren County, at bridge on 24th Street, 3.0 miles east of Lawton, MI.	9.20	1980	04-23-80 10-14-80 05-11-81 07-06-81	8.90 8.40 35.2 *5.52
Cook Drain	East Branch Paw Paw River	Lat 42°42'30", long 85°49'25", in NW¼ SW¼ sec.15, T.3 S., R.13 W., Van Buren County, at bridge on 28th Avenue, 2.0 miles west of Mattawan, MI.	10.6	1970, 1980	04-23-80 10-14-80 05-11-81 07-06-81	2.04 1.04 31.3 *.70
Brandywine Creek	North Branch Paw Paw River	Lat 42°18'53", long 85°54'30", in NW¼ NW¼ sec.11, T.2 S., R.14 W., Van Buren County, at bridge on 37th Street, 3.4 miles south of Gobles, MI.	9.05	1962-64 1980	04-24-80 10-14-80 05-11-81 07-06-81	6.64 2.71 30.8 *1.67
North Extension Drain	Brandywine Creek	Lat 42°19'01", long 85°55'10", in SE¼ SE¼ sec.3, T.2 S., R.14 W., Van Buren County, at bridge at 28th Street, 3.7 miles southwest of Gobles, MI.	10.7	1980	04-24-80 10-14-80 05-12-81 07-06-81	8.12 2.72 48.0 *1.04
Brush Creek	Red Creek	Lat 42°09'24", long 86°03'20", in NE¼ sec.4, T.4 S., R.15 W., Van Buren County, at bridge on 72nd Avenue, 4.5 miles south of Lawrence, MI.	16.0	1962-64, 1980	04-23-80 05-21-80 10-15-80 05-12-81 07-08-81	19.0 15.4 11.2 35.9 *10.1
Red Creek	Paw Paw River	Lat 42°10'10", long 86°04'15", in NE¼ sec.33, T.3 S., R.15 W., Van Buren County, at bridge at 54th Street, 3.5 miles south of Lawrence, MI.	6.89	1962-64, 1980	04-24-80 10-15-80 05-13-81 07-08-81	4.34 1.76 19.5 *1.24
Pine Creek	do	Lat 42°12'20", long 86°10'55", in SW¼ sec.16, T.3 S., R.16 W., Van Buren County, at bridge at Highway 12, 1.0 mile west of Hartford, MI.	9.67	1980	04-23-80 10-14-80 05-13-81 07-08-81	6.90 4.30 16.9 *3.72
Haven and Max Lake Drain	South Branch Black River	Lat 42°22'25", long 85°59'11", in NE¼ NW¼ sec.19, T.1 S., R.14 W., Van Buren County, at bridge at 45th Street, 1.0 mile southwest of Bloomingdale, MI.	9.34	1973	10-14-80 05-12-81 07-07-81	5.34 80.8 *3.18
do	do	Lat 42°22'08", long 86°00'01", in SW¼ NE¼ sec.24, T.1 S., R.15 W., Van Buren County, at bridge at 46½ Street, 2.0 miles southwest of Bloomingdale, MI.	12.3	1980	04-23-80 10-15-80 05-11-81 07-07-81	15.7 8.58 147 *4.47
Black River	Lake Michigan	Lat 42°24'54", long 86°13'31", in NE¼ sec.1, T.1 S., R.17 W., Van Buren County, at bridge on 70th Street, 2.0 miles northeast of South Haven, MI.	130	1962-64	09-18-81	49.4
Middle Fork Black River	Black River	Lat 42°25'09", long 86°02'25", in NW¼ sec.3, T.1 S., R.15 W., Van Buren County, at bridge at Baseline Road, 5.5 miles northwest of Bloomingdale, MI.	5.01	1980	04-23-80 10-15-80 05-12-81 07-07-81	7.85 4.21 44.8 *2.30

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams Tributary to Lake Michigan--Continued				
Melvin Creek	Middle Fork Black River	Lat 42°24'33", long 86°00'35", in NE¼ NW¼ sec.1, T.1 S., R.15 W., Van Buren County, at bridge at 47½ Street, 3.2 miles northwest of Bloomingdale, MI.	7.10	1962-64, 1980	04-24-80 10-15-80 05-13-81 07-07-81	6.57 6.35 29.4 *2.76
Barber Creek	do	Lat 42°25'09", long 86°03'40", in SW¼ sec.34, T.1 N., R.15 W., Allegan County, at bridge on Baseline Road, 1.1 miles east of Grand Junction, MI.	7.71	1962-64, 1980	04-23-80 10-15-80 05-12-81 07-07-81	11.5 9.51 40.5 *5.58
Pine Creek	Baseline Creek	Lat 42°24'40", long 85°46'15", in SE¼ sec.1, T.1 S., R.13 W., Van Buren County, at bridge at 2nd Avenue, 6.5 miles northeast of Gobles, MI.	9.61	1980	04-24-80 05-22-80 10-15-80 05-11-81 07-08-81	40.5 37.8 34.8 222 *27.1
Grand River	Lake Michigan	Lat 42°37'51", long 84°37'21", along section line of sec.23/24, T.3 N., R.3 W., Eaton County, at bridge at M-99, 1.5 miles southeast of Dimondale, MI.	--	--	08-25-81	*c176
Silver Creek	Grand River	Lat 42°38'52", long 84°39'32", in SE¼ NE¼ sec.15, T.3 N., R.3 W., Eaton County, below Whaley Drain, in city of Dimondale, MI.	--	--	08-25-81	*c.79
West Branch Red Cedar River	Red Cedar River	Lat 42°42'35", long 84°21'50", in SE¼ NW¼ sec.7, T.3 N., R.3 E., Livingston County, at bridge on M-43, 3.5 miles west of Fowlerville, MI.	--	--	06-24-81 08-06-81 08-12-81	c98 *c31 *c29.3
Red Cedar River	Grand River	Lat 42°41'17", long 84°17'22", in SE¼ sec.35, T.4 N., R.1 E., Ingham County, above Deer Creek, in the city of Williamston, MI.	--	--	08-12-81	*c28.3
Deer Creek	Red Cedar River	Lat 42°41'16", long 84°17'23", in SW¼ SE¼ sec.35, T.4 N., R.1 E., Ingham County, at bridge on M-43, in the city of Williamston, MI.	--	--	08-12-81	*c2.44
Unnamed Tributary	do	Lat 42°41'17", long 82°18'08", in SW¼ sec.35 T.4 N., R.1 E., Ingham County, 0.1 mile east of Corwin Road, in the city of Williamston, MI.	--	--	08-12-81	*c.34
Red Cedar River	Grand River	Lat 42°42'25", long 84°18'52", in NE¼ SW¼ sec.27, T.4 N., R.1 E., Ingham County, at bridge on Zimmer Road, 2.0 miles northwest of Williamston, MI.	--	--	08-12-81	*c28.8
do	do	Lat 42°43'31", long 84°31'05", in NW¼ NE¼ sec.23, T.4 N., R.2 W., Ingham County, at bridge on I-496 overpass, in the city of East Lansing, MI.	--	--	08-12-81 08-25-81	*c44.0 *c34.5
Sycamore Creek	Red Cedar River	Lat 42°41'04", long 84°31'25", in SE¼ SE¼ sec.34, T.4 N., R.2 W., Ingham County, at bridge on Aurelius Road, in the city of Lansing, MI.	96.2	1963-65b	08-12-81 08-25-81	*c17.0 *c7.86
Miller Creek	Grand River	Lat 42°45'20", long 84°41'17", in SW¼ SW¼ sec.5, T.4 N., R.3 W., Eaton County, at bridge on Willow Highway, 2.0 miles east of Grand Ledge, MI.	--	--	08-25-81	*c.24
Grand River	Lake Michigan	Lat 42°45'22", long 84°42'05", in SW¼ SW¼ sec.5, T.4 N., R.3 W., Eaton County, 0.1 mile west of Miller Creek, 2.0 miles east of Grand Ledge, MI.	--	--	08-25-81	*c221
Fish Creek	Maple River	Lat 42°14'30", long 84°54'56", in NW¼ SW¼ sec.21, T.10 N., R.5 W., Montcalm County, at bridge on Crystal Lake Road, 1.0 mile south of Crystal, MI.	92.8	1963-65b	08-04-81	*c32.0

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams Tributary to Lake Michigan--Continued				
Fish Creek	Maple River	Lat 43°07'35", long 84°50'42", in SW¼ NE¼ sec.36, T.9 N., R.5 W., Montcalm County, at bridge on Jenks Road, 1.5 miles north of Hubbardston, MI.	157	1963-65b	08-04-81	[a]c46.0
do	do	Lat 43°05'25", long 84°50'00", in NW¼ NE¼ sec.13, T.8 N., R.5 W., Ionia County, below the dam, in the city of Hubbardston, MI.	--	--	08-04-81	[a]c53.0
Duncan Lake Outlet	Thornapple River	Lat 42°45'15", long 85°31'50", in SE¼ SE¼ sec.6, T.4 N., R.10 W., Barry County, at Duncan Lake outlet, 3.0 miles northwest of Middleville, MI.	--	--	04-07-81	[a]c10.8
Rush Creek	Grand River	Lat 42°54'15", long 85°47'03", in NE¼ SE¼ sec.13, T.6 N., R.12 W., Kent County, at bridge on Chicago Drive, 0.25 mile south of Jenison, MI.	--	--	05-12-81	1270
Brookings Lake Outlet	Tank Creek	Lat 43°42'08", long 85°52'10", in NE¼ SW¼ sec.9, T.15 N., R.13 W., Newago County, at Lakeshore Drive, 2.5 miles southwest of Bitely, MI.	--	--	03-11-81	[a]c3.25
Williamsburg Creek	Elk Lake	Lat 44°47'41", long 85°23'19", in SE¼ NW¼ sec.27, T.26 N., R.9 W., Grand Traverse County, at Cram Road, 1.7 miles northeast of Williamsburg, MI.	--	--	10-14-80	[a]c12.0
Platte River	Platte Lake	Lat 44°40'29", long 85°55'48", in SE¼ SW¼ sec.6, T.26 N., R.13 W., Benzie County, at Fewins Road, 4.1 miles northeast of Honor, MI.	--	1980	10-15-80	c53.4
					11-05-80	[a]c53.6
					12-09-80	[a]c60.0
					01-13-81	[a]c56.5
					01-23-81	[a]c61.5
					03-11-81	[a]c56.0
					04-14-81	c72.4
					05-12-81	[a]c67.0
Brundage Creek	Platte River	Lat 44°39'48", long 85°55'27", in SW¼ SE¼ sec.7, T.26 N., R.13 W., Benzie County, at U.S. Highway 31, 700 ft downstream from Stanley Creek, 0.5 mile upstream from mouth, and 4.7 miles east of Honor, MI.	12.5	1957 1966-69 1980	10-15-80	c12.4
					11-05-80	[a]c10.9
					12-09-80	[a]c12.6
					01-13-81	[a]c11.3
					02-23-81	c13.9
					03-11-81	[a]c11.6
					04-14-81	c12.6
					05-12-81	[a]c11.5
Platte River	Platte Lake	Lat 44°39'36", long 85°56'36", in SW¼ SE¼ sec.12, T.26 N., R.14 W., Benzie County, at U.S. Highway 31, 4.0 miles east of Honor, MI.	91.9	1957 1959-69 1980	10-15-80	c73.5
					11-05-80	[a]c76.5
					12-09-80	[a]c77.2
					01-13-81	[a]c74.0
					01-23-81	[a]c82.8
					03-11-81	[a]c75.4
					04-14-81	c93.5
					05-12-81	[a]c85.0
Carter Creek	Platte River	Lat 44°38'30", long 85°59'28", in NE¼ NE¼ sec.22, T.26 N., R.14 W., Benzie County, at Brownell Road, 0.5 mile upstream from mouth and 2.5 miles southeast of Honor, MI.	10.9	1958 1980	10-15-80	c6.68
					11-04-80	[a]c6.80
					12-10-80	[a]c6.56
					01-13-81	[a]c6.29
					01-23-81	[a]c8.00
					03-10-81	[a]c6.85
					04-14-81	c7.88
					05-12-81	[a]c7.90
Platte River	Platte Lake	Lat 44°38'51", long 85°59'26", in SE¼ SW¼ sec.15, T.26 N., R.14 W., Benzie County, at Case Bridge on Pioneer Road, 0.5 mile downstream from Carter Creek, and 2.0 miles southeast of Honor, MI.	109	1958, 1971, 1980	10-15-80	c97.2
					11-05-80	[a]c99.6
					12-09-80	[a]c115
					01-13-81	[a]c102
					01-23-81	[a]c119
					03-10-81	[a]c108
					04-14-81	c117
					05-12-81	[a]c108

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft³/s)
		Streams Tributary to Lake Michigan--Continued				
Collison Creek	Platte River	Lat 44°39'45", long 86°00'10", in SW¼ SE¼ sec.9, T.26 N., R.14 W., Benzie County, at U.S. Highway 31, 0.2 mile upstream from mouth at Honor, MI.	4.75	1958, 1980	10-15-80 11-04-80	c.48 *c.54
Platte River	Platte Lake	Lat 44°40'17", long 86°02'12", in NW¼ NW¼ sec.8, T.26 N., R.14 W., Bwnzie County, at Indian Hill Road, 1.0 mile northwest of Honor, MI.	--	1980	10-14-80 11-04-80 12-09-80 01-13-81 01-23-81 03-10-81 04-14-81 05-12-81	c110 *c105 *c120 *c103 *c133 *c116 c141 *c124
North Branch Platte River	Platte River	Lat 44°41'01", long 86°03'30", in SE¼ NE¼ sec.1, T.27 N., R.15 W., Benzie County, at Deadstream Road, 2.5 miles northwest of Honor, Mi.	31.1	1958, 1980	10-14-80 11-04-80 12-09-80 01-13-81 01-23-81 03-10-81 04-14-81 05-12-81	c19.2 *c27.3 *c34.8 *c35.9 *c37.7 *c35.0 c40.2 *c22.6
Unnamed Tributary	Platte Lake	Lat 44°40'05", long 86°02'50", in SE¼ NW¼ sec.7, T.26 N., R.14 W., Benzie County, at South Lake Road, 2.0 miles west of Honor, MI.	--	1980	10-14-80 11-04-80	c1.56 *c.71
do	do	Lat 44°40'10", long 86°03'57", in SW¼ SE¼ sec.12, T.26 N., R.15 W., Benzie County, at South Lake Road, 2.5 miles west of Honor, MI.	--	1980	10-14-80 11-04-80	c3.76 *c1.40
do	do	Lat 44°41'16", long 86°07'11", in SE¼ NE¼ sec.4, T.26 N., R.15 W., Benzie County, at South Lake Road, 6.5 miles northwest of Honor, MI.	--	1980	11-04-80 11-04-80	c.62 *c.37
Otter Creek	Lake Michigan	Lat 44°44'32", long 86°03'41", in SE¼ NE¼ sec.13, T.27 N., R.15 W., Benzie County, at outlet of Otter Lake, 1.8 miles upstream from mouth, and 4.8 miles south of Empire, MI.	1.2	1979-80	05-07-81	*1.85
		Streams Tributary to Lake Huron				
Upper South Branch Thunder Bay River	Thunder Bay River	Lat 45°03'30", long 83°47'00", in NE¼ NE¼ sec.23, T.31 N., R.5 E., Alpena County, at State Highway 32, 3.5 miles southwest of Lachine, MI.	171	1945-53d	08-31-81	*c79.0
Lower South Branch Thunder Bay River	South Branch Thunder Bay River	Lat 44°51'35", long 83°35'40", in NW¼ NE¼ sec.4, T.28 N., R.7 E., Alcona County, at outlet of Hubbard Lake, 1.0 mile south of Hubbard Lake, MI.	146	1945-53d	08-31-81	*c79.0
Shiawassee River	Saginaw River	Lat 42°47'32", long 83°38'07", in SW¼ NE¼ sec.33, T.5 N., R.7 E., Oakland County, near railroad tracks, in Holly, MI.	--	1980	10-07-80 11-13-80 12-17-80 01-15-81 02-19-81 03-17-81 04-16-81 05-19-81 06-25-81 07-16-81 08-27-81	*c17.8 *c21.2 *c16.2 c21.0 c90.7 c31.9 c66.9 c45.3 c17.6 *c10.8 *c11.1
do	do	Lat 42°47'57", long 83°38'52", in SW¼ sec. 28, T.5 N., R.7 E., Oakland County, at Fish Lake Road, 0.5 mile west of Holly, MI.	49.2	1955, 1963, 1966-68, 1980	10-07-80 11-13-80 12-17-80 01-15-81 02-19-81 03-17-81 04-16-81 05-19-81 06-25-81 07-16-81 08-27-81	*c21.6 *c24.7 *c23.7 c23.1 c86.0 c35.0 c70.8 c45.5 c18.8 *c10.5 *c9.9

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams Tributary to Lake Huron--Continued				
Shiawassee River	Saginaw River	Lat 42°47'42", long 83°42'20", in NW¼ NW¼ sec.36, T.5 N., R.6 E., Genesee County, below dam at Fenton, MI.	--	1980	10-07-80	*c21.8
					11-13-80	*c28.0
					12-17-80	*c24.7
					01-15-81	c20.7
					02-19-81	c147
					03-17-81	c42.4
					04-16-81	c85.6
					05-19-81	c62.8
					06-25-81	c19.5
					07-16-81	*c11.6
					08-27-81	*c13.4
do	do	Lat 42°48'54", long 83°43'32", in SW¼ SW¼ sec.23, T.5 N., R.6 E., Genesee County, at Torrey Road, 0.2 mile northwest of Fenton, MI.	--	1963, 1966, 1980	10-07-80	*c23.8
					11-13-80	*c28.1
					12-17-80	c35.2
					01-15-81	c38.8
					02-19-81	c140
					03-17-81	c44.4
					04-16-81	c89.8
					05-19-81	c69.0
					06-25-81	c25.0
					07-16-81	*c13.9
					08-27-81	*c9.2
Brady Creek	Bad River	Lat 43°17'15", long 84°35'15", in NW¼ NE¼ sec.6, T.10 N., R.2 W., Gratiot County, above WWTP lagoon outfall at Ithaca, MI.	--	1980	10-28-80	*c.06
do	do	Lat 43°17'15", long 84°35'13", in NE¼ NE¼ sec.6, T.10 N., R.2 W., Gratiot County below WWTP lagoon outfall at Ithaca, MI.	--	1980	10-28-80	*c6.27
Unnamed Tributary	Brady Creek	Lat 43°16'37", long 84°34'21", in SE¼ SW¼ sec.5, T.10 N., R.2 W., Gratiot County, 1.5 miles southeast of Ithaca, MI.	--	--	10-28-80	*c1.42
Brady Creek	Bad River	Lat 43°16'37", long 84°33'47", in SW¼ SW¼ sec.4, T.10 N., R.2 W., Gratiot County, on Bagley Road, 1.0 mile east of Ithaca, MI.	--	1980	10-28-80	*c8.73
Sand Creek	Brady Creek	Lat 43°17'04", long 84°31'46", in SW¼ NE¼ sec.3, T.10 N., R.2 W., Gratiot County, at bridge on Shroyer Road, 2.5 miles east of Ithaca, MI.	--	--	10-28-80	*c2.62
Brady Creek	Bad River	Lat 43°16'43", long 84°31'25", in SW¼ SW¼ sec.2, T.10 N., R.2 W., Gratiot County, on Crapo Road, 3.0 miles east of Ithaca, MI.	--	1980	10-28-80	*c14.7
Bad River	Shiawassee River	Lat 43°17'48", long 84°13'45", in NW¼ sec.3, T.10 N., R.2 E., Saginaw County, at Hemlock Road, 2.5 miles north of Brant, MI.	a89	1949-50d, 1980	06-01-81	*15.4
do	do	Lat 43°18'08", long 84°08'38", in NW¼ sec.5, T.10 N., R.3 E., Saginaw County, at State Highway 52, in St. Charles, MI.	--	1980	06-02-81	*15.0
South Fork Bad River	Bad River	Lat 43°15'33", long 84°12'32", in NE¼ sec.22, T.10 N., R.2 E., Saginaw County, at Brant Road, 1.0 mile east of Brant, MI.	--	1980	06-01-81	*11.2
Potato Creek	South Fork Bad River	Lat 43°15'42", long 84°12'33", in SE¼ sec.15, T.10 N., R.2 E., Saginaw County, at Raucholz Road, 1.0 mile east of Brant, MI.	--	1980	06-01-81	*4.48
South Fork Bad River	Bad River	Lat 43°17'54", long 84°08'32", in SW¼ sec.5, T.10 N., R.3 E., Saginaw County, at State Highway 52, in St. Charles, MI.	--	1963, 1980	06-02-81	*17.0
Beaver Creek	do	Lat 43°20'13", long 84°13'44", in SW¼ sec.22, T.11 N., R.2 E., Saginaw County, at Hemlock Road, 0.2 mile north of Nelson, MI.	--	1980	06-01-81	*8.65

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams Tributary to Lake Huron--Continued				
Pickerel Creek	Bad River	Lat 43°16'08", long 84°07'44", in NW¼ sec.16, T.10 N., R.3 E., Saginaw County, at McKeighan Road, 1.0 mile north of Fergus, MI.	--	1980	05-27-81	*2.45
Wolf Creek	do	Lat 43°20'11", long 84°11'22", in SW¼ sec.24, T.11 N., R.2 E., Saginaw County, at Fordney Road, 2.0 miles east of Nelson, MI.	--	1980	05-29-81	*1.46
Shiawassee River	Saginaw River	Lat 43°20'17", long 84°04'20", in SE¼ sec.23, T.11 N., R.3 E., Saginaw County, at extension of Miller Road, 3.0 miles southeast of Swan Creek, MI.	--	1980	05-28-81	*483
Bear Creek	Shiawassee River	Lat 43°15'19", long 84°05'18", in NW¼ sec.2, T.10 N., R.3 E., Saginaw County, at Fergus Road, 2.1 miles east of Fergus, MI.	--	1980	06-01-81	*1.46
Swan Creek	do	Lat 43°24'03", long 84°05'57", in SE¼ sec.34, T.12 N., R.3 E., Saginaw County, at Schomaker Road, 3.9 miles northeast of Garfield, MI.	--	1980	05-29-81	*31.4
Marsh Creek	Swan Creek	Lat 43°21'56", long 84°10'22", in SE¼ sec.12, T.11 N., R.2 E., Saginaw County, at Roosevelt Road, 2.2 miles northwest of Garfield, MI.	--	1980	05-29-81	*2.55
Swan Creek	Shiawassee River	Lat 43°21'18", long 84°04'20", in SW¼ sec.13, T.11 N., R.3 E., Saginaw County, at Miller Road, 3.1 miles east of Garfield, MI.	--	1980	05-28-81	*100
Flint River	do	Lat 43°01'13", long 83°42'20", in NE¼ SW¼ sec.7, T.7 N., R.6 E., Genesee County, at bridge on Hamilton Avenue, in the city of Flint, MI.	--	--	07-29-81 08-05-81 08-07-81	149 *81.8 *84.2
do	do	Lat 43°01'09", long 83°41'30", in SW¼ SW¼ sec.7, T.7 N., R.6 E., Genesee County at bridge on North Street, in the city of Flint, MI.	--	--	07-09-81	176
do	do	Lat 43°00'54", long 83°41'46", in NE¼ NE¼ sec.13, T.7 N., R.6 E., Genesee County, at bridge on Grand Traverse Street, in the city of Flint, MI.	--	--	08-04-81	*85.7
Swartz Creek	Flint River	Lat 43°00'48", long 83°41'55", in SW¼ NE¼ sec.13, T.7 N., R.6 E., Genesee County, at bridge on Kearsley Street, in the city of Flint, MI.	54.3	1969, 1974	08-04-81 08-07-81 08-08-81 08-10-81 08-14-81	*11.1 *8.22 22.3 11.2 *6.39
Flint River	Shiawassee River	Lat 43°00'35", long 83°42'34", in NE¼ SW¼ sec.13, T.7 N., R.6 E., Genesee County, at bridge on Chevrolet Avenue, in the city of Flint, MI.	--	--	07-29-81	221
do	do	Lat 43°01'03", long 83°44'04", in NW¼ SE¼ sec.14, T.7 N., R.6 E., Genesee County, at bridge on Ballenger Highway, in the city of Flint, MI.	--	--	07-29-81 08-04-81	213 *85.5
do	do	Lat 43°43'47", long 83°51'25", in SE¼ SE¼ sec.27, T.8 N., R.5 E., Genesee County, at bridge on Main Street, in the city of Flushing, MI.	--	1954, 1959	08-04-81 08-19-81	*139 177
do	do	Lat 43°10'34", long 83°52'41", in SE¼ SE¼ sec.16, T.9 N., R.5 E., Genesee County, at bridge on M-57, 0.25 mile east of Montrose, MI.	--	1959, 1978	08-05-81	*148
Brent Run	Flint River	Lat 43°11'13", long 83°51'48", in SE¼ NW¼ sec.15, T.9 N., R.5 E., Genesee County, at bridge on McKinley Road, 1.0 mile northeast of Montrose, MI.	--	1963, 1974, 1978	08-05-81 08-08-81 08-10-81 08-14-81 08-14-81	*4.52 6.39 6.35 *4.58 *4.87

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams Tributary to Lake Huron--Continued				
Pine Run	Flint River	Lat 43°15'12", long 83°52'01", in NE¼ SW¼ sec.22, T.10 N., R.5 E., Saginaw County, at bridge on Morseville Road, 1.25 milos north of Morseville, MI.	--	1963	08-05-81 08-08-81 08-10-81 08-14-81	*2.09 2.98 4.17 *1.94
Silver Creek	do	Lat 43°16'39", long 83°53'08", in NE¼ NW¼ sec. 16, T.10 N., R.5 E., Saginaw County, at bridge on Canada Road, 1.5 miles southeast of Fosters, MI.	--	--	08-08-81	4.34
Duff Creek	Cass River	Lat 43°19'43", long 83°04'00", in SE¼ SE¼ sec.32, T.11 N., R.12 E., Sanilac County, above waste water treatment plant in Marlette, MI.	--	1980	10-23-80 11-06-80	*c.08 *c.07
do	do	Lat 43°19'47', long 83°03'52", in SE¼ SE¼ sec.32, T.11 N., R.12 E., Sanilac County, at Boyne Road, 0.2 mile east of Marlette, MI.	--	1980	10-23-80 11-06-80	*c.22 *c.77
do	do	Lat 43°20'47", long 83°02'42", in SW¼ SW¼ sec.27, T.11 N., R.12 E., Sanilac County, at Decker Road, 1.5 miles northeast of Marlette, MI.	--	1980	11-06-80	*c1.74
do	do	Lat 43°21'29", long 83°01'37", in NE¼ NE¼ sec.27, T.11 N., R.12 E., Sanilac County, at Frenchline Road, 2.9 miles northeast of Marlette, MI.	--	1980	10-23-80	*c3.59
do	do	Lat 43°21'04", long 83°03'30", in SE¼ SW¼ sec.28, T.11 N., R.12 E., Sanilac County, at Mayville Road, 1.5 miles northeast of Marlette, MI.	--	--	10-23-80	*c1.85
		Streams tributary to Lake Erie				
Norton Creek	Huron River	Lat 42°31'53", long 83°32'52", in NE¼ SW¼ sec.31, T.2 N., R.8 E., Oakland County, at West Maple Road, 0.5 mile northwest of Wixom, MI.	--	1980	10-21-80	c5.66
do	do	Lat 42°32'36", long 83°33'02", in NE¼ SW¼ sec.30, T.2 N., R.8 E., Oakland County, south of Charms Road, below the Wixom Waste Water Treatment Plant, 1.5 miles northwest of Wixom, MI.	--	1977-78, 1980	10-21-80	c8.81
Davis Creek	do	Lat 42°27'57", long 83°42'26", in SE¼ NE¼ sec.22, T.1 N., R.6 E., Livingston County, at Doane Road, 2.3 miles west of South Lyon, MI.	--	1980	10-01-80 11-06-80	c7.3 *c5.4
Walker Drain	Inchwagh Lake	Lat 42°25'52", long 83°40'17", in SW¼ SE¼ sec.36, T.1 N., R.6 E., Livingston County, at Eight Mile Road, 1.2 miles southwest of South Lyon, MI.	--	1980	10-01-80 11-06-80	c2.3 *c1.2
Unnamed Tributary	do	Lat 42°26'43", long 83°39'58", in NW¼ NW¼ sec.31, T.1 N., R.7 E., Oakland County, at Nine Mile Road, 0.3 mile west of South Lyon, MI.	--	1980	10-01-80 11-06-80	c1.2 *c.68
Yerkes Drain	do	Lat 42°27'21", long 83°39'04", in NE¼ sec.30, T.1 N., R.7 E., Oakland County, at Pontiac Trail Road, at South Lyon, MI.	--	1980	10-01-80 11-06-80	c.4 *c.11
do	do	Lat 42°27'21", long 83°39'38", in NW¼ NW¼ sec.30, T.1 N., R.7 E., Oakland County, below WWTP, at South Lyon, MI.	--	1980	10-01-80 11-06-80	c3.3 *c4.02
Inchwagh Lake Outlet	Davis Creek	Lat 42°27'09", long 83°41'46", in NE¼ sec.26, T.1 N., R.6 E., Livingston County, at Rushton Road, 1.8 miles west of South Lyon, MI.	18.9	1970-71, 1980	10-01-80 11-06-80	c8.4 *c.21

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams Tributary to Lake Erie--Continued				
Tobin Lake Outlet	Davis Creek	Lat 42°26'37", long 83°42'33", in NE¼ sec.34, T.1 N., R.6 E., Livingston County, at Nine Mile Road, 1.6 miles east of Whitmore Lake, MI.	--	1980	10-01-80 11-06-80	c6.8 *c2.6
Monahan Lake Outlet	do	Lat 42°26'57", long 83°43'57", in NW¼ SE¼ sec.28, T.1 N., R.6 E., Livingston County, on Tuthill Road, 0.9 mile northeast of Whitmore Lake, MI.	--	--	10-01-80 11-06-80	c.5 *c.21
Haas Drain	Mill Creek	Lat 42°16'02", long 83°55'23", in NE¼ sec.35, T. 2 S., R.4 E., Washtenaw County, at bridge on Liberty Road, 2.5 miles southeast of Lima Center, MI.	9.7	1970-72	05-05-81 06-01-81 07-07-81 08-18-81 09-09-81 09-15-81	5.34 *6.78 .81 .66 *12.4 *4.15
Mill Creek	Huron River	Lat 42°16'53", long 83°55'22", in NE¼ sec.26, T.2 S., R.4 E., Washtenaw County, at bridge on Jerusalem Road, 2.0 miles southeast of Lima Center, MI.	59.8	1970-72, 1980	05-05-81 06-01-81 07-07-81 08-18-81 09-15-81	39.4 *49.4 18.4 12.4 *31.1
Black Creek	River Raisin	Lat 41°47'10", long 84°02'26", in SE¼ SE¼ sec.10, T.8 S., R.3 E., Lenawee County, at bridge on M-52, 0.5 mile south of Jasper, MI.	42.4	1963, 1970, 1974	10-08-80	*c5.3
Saline-Bridgewater Drain	Saline River	Lat 42°08'18", long 83°52'08", in NW¼ sec.17, T.4 S., R.5 E., Washtenaw County, 15 ft west of Feldcamp Road, 200 ft upstream of mouth, and 0.5 mile north of Benton, MI.	--	--	05-05-81 06-01-81 07-09-81 08-18-81 09-15-81	3.52 *3.21 1.84 1.77 *5.35
Bauer Drain	do	Lat 42°09'38", long 83°51'01", in NW¼ sec.4, T.4 S., R.5 E., Washtenaw County, at bridge on Austin Road, 0.3 mile upstream of mouth, and 2.3 miles north of Benton, MI.	7.30	1970-72	05-06-81 06-01-81 07-09-81 08-18-81 09-15-81	3.30 *3.81 .77 .65 *3.85
Saline River	River Raisin	Lat 42°10'15", long 83°49'32", in NE¼ SW¼ sec.34, T.3 S., R.5 E., Washtenaw County, at bridge on Dell Road, 1.5 miles west of Saline, MI.	44.3	1964, 1980	10-08-80 05-05-81 06-01-81 07-08-81 08-18-81 09-16-81	c10.5 29.3 *32.4 10.7 10.7 *29.5
do	do	Lat 42°09'32", long 83°47'16", in NE¼ SW¼ sec.1, T.4 S., R.5 E., Washtenaw County, 1500 ft below the Curtiss Park Dam, in the city of Saline, MI.	--	--	10-08-80	*c15.9
Pittsfield Drain	Saline River	Lat 42°09'33", long 83°45'30", in SE¼ sec.6, T.4 N., R.6 E., Washtenaw County, at Willis Road, in Saline, MI.	5.12	1964, 1980	10-08-80	c.2
Koch-Warner Drain	do	Lat 42°09'20", long 83°46'30", in SW¼ SW¼ sec.6, T.4 S., R.6 E., Washtenaw County, at Saline Milan Road, at Saline, MI.	12.1	1970-72, 1980	10-08-80	c5.5
Saline River	River Raisin	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, at Maple Road, 2.8 miles south of Saline, MI.	94.6	1966-77d 1978-80e	10-08-80 05-07-81 06-02-81 07-08-81 08-19-81 09-16-81	c28.4 26.4 *52.9 25.0 22.7 *55.5
Wanty Drain	Saline River	Lat 42°02'23", long 83°37'40", in NW¼ sec.20 T.5 S., R.7 E., Monroe County, at bridge at Plank Road, 2.4 miles northeast of Azalia, MI.	--	--	05-06-81 06-02-81 07-08-81 08-19-81 09-16-81	2.22 .95 .20 .13 1.38

See footnotes at end of table.

DISCHARGE MEASUREMENTS AT MISCELLANEOUS SITES DURING WATER YEAR 1981--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams Tributary to Lake Erie--Continued				
Bear Creek	Saline River	Lat 42°01'37", long 87°38'08", in SW¼ sec.20, T.5 S., R.7 E., Monroe County, at bridge on Bunce Road, 1.1 miles west of London, MI.	--	--	05-06-81	1.19
					06-02-81	.87
					07-08 81	.13
					08-07-81	.07
					09-16-81	2.04
Saline River	River Raisin	Lat 41°58'59", long 83°36'59", in NE¼ sec.8, T.6 S., R.7 E., Monroe County, at bridge on Bigelow Road, 0.6 mile upstream from mouth, and 3.0 miles east of Dundee, MI.	--	--	05-07-81	79.4
					06-02-81	74.0
					07-08-81	34.2
					08-19-81	29.2
					09-16-81	101

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* Base flow.
† Flow includes leakage from mine tailings pond.
‡ Flow includes leakage and diversion from mine tailings pond.
a Approximately.
b Operated as a low-flow partial-record station.
c Discharge measurement made by employees of Michigan Department of Natural Resources.
d Operated as a continuous-record gaging station.
e Operated as a crest-stage partial-record station.

MARQUETTE IRON RANGE LOW-FLOW INVESTIGATIONS

MARQUETTE COUNTY, MI--Continued

Stream	Location	Drainage area (mi²)	Measured discharge (ft³/s)	Cfs per square mile	Measured discharge (ft³/s)	Cfs per square mile
			Oct. 1, 2, 1980		July 14, 15, 1981	
Cedar Creek	Lat 46°27'08", long 87°22'46", in NE¼ SW¼ sec.24, T.47 N., R.25 W., Marquette County, about 1 mile upstream from gaging station (04044573), 2.5 miles northeast of Sands and 4.4 miles northeast of Gentian.	7.67	10.50	1.37	10.10	1.32
do	Gaging station near Harvey (04044573).	9.04	13.71	1.52	12.39	1.37
do[a]	Lat 46°28'23", long 87°19'46", in SE¼ NE¼ sec.17, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.7 mile upstream from mouth, 1.8 miles southeast of Harvey and 0.9 mile northwest of Beaver Grove.	10.6	18.26	1.72	17.72	1.67
Cherry Creek	Lat 46°27'43", long 87°24'20", in NW¼ NW¼ sec.23, T.47 N., R.25 W., Marquette County, at headwaters, 3.3 miles southwest of Harvey and 4.0 miles northeast of Cascade.	.14	.03	.21	--	--
do[a]	Lat 46°27'47", long 87°23'31", in NW¼ NE¼ sec.23, T.47 N., R.25 W., Marquette County, about 600 ft north of County Road 480, at point where creek bends north, 2.8 miles southwest of Harvey and 3.1 miles northeast of Sands.	.33	5.79	17.55	5.65	17.12
do	Lat 46°28'02", long 87°22'52", in NW¼ SW¼ sec.13, T.47 N., R.25 W., Marquette County, at end of trail road, 2.2 miles southwest of Harvey and 4.9 miles northeast of Gentian.	.61	9.56	15.67	9.70	15.90
do	Gaging station near Harvey (04044583).	4.53	18.68	4.12	18.88	4.17
do[a]	Lat 46°28'45", long 87°20'18", in SE¼ SW¼ sec.8, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.8 mile upstream from mouth, 1.2 miles southeast of Harvey and 1.5 miles northwest of Beaver Grove.	5.07	25.53	5.04	25.45	5.02
Silver Creek	Lat 46°28'22", long 87°23'48", in SE¼ NW¼ sec.14, T.47 N., R.25 W., Marquette County, at trail crossing, 2.5 miles southwest of Harvey and 4.6 miles northeast of Cascade.	4.37	3.59	.82	3.23	.74
do	Lat 46°28'12", long 87°23'06", in SW¼ NW¼ sec.13, T.47 N., R.25 W., Marquette County, at point where stream turns north, 0.7 mile upstream from small unnamed tributary entering from the left and 3.4 miles west of Beaver Grove.	4.57	2.89	.63	--	--
do[a]	Lat 46°28'48", long 87°23'07", in SW¼ SW¼ sec.12, T.47 N., R.25 W., Marquette County, at double culvert on Silver Creek Road, 1.7 miles southwest of Harvey and 4.3 miles northeast of Sands.	4.88	2.69	.55	2.05	.42
Unnamed Tributary to Silver Creek	Lat 46°28'56", long 87°23'01", in NW¼ SW¼ sec.12, T.47 N., R.25 W., Marquette County, at mouth and 1.5 miles southwest of Harvey.	1.09	.04	.04	--	--
Silver Creek	Gaging station at Harvey (04044595).	8.58	8.94	1.04	8.75	1.02
do[a]	Lat 46°29'22", long 87°20'16", in NE¼ NW¼ sec.8, T.47 N., R.24 W., Marquette County, at bridge on Lake Superior and Ishpeming Railroad, 300 ft northwest of overpass on State Highway 28 and 0.9 mile southeast of Harvey.	9.91	8.82	.89	8.08	.82

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[a] At site of partial-record station

MARQUETTE IRON RANGE LOW-FLOW INTESTIGATIONS

MARQUETTE COUNTY, MI

Two series of base-flow discharge measurements were made at selected locations on the western tributaries of the Chocolay River basin as part of a water resources investigation carried on in cooperation with the Michigan Department of Natural Resources. The first series was made on Oct. 1, 2, 1980 and the second series was made on July 14, 15, 1981. These measurements, along with streamflow records, ground-water records, water-quality records, and geologic studies, serve to provide base line data to evaluate hydrologic conditions prior to development of the area. The measurements are believed to be unaffected by surface runoff due to antecedent precipitation, and thus represent base flow.

The measurements on each stream are listed in order proceeding downstream, and each tributary is inserted in the order in which it enters the main stream. Drainage areas shown are determined from U.S. Geological Survey topographic maps having scales of 1:24,000 or 1:62,500 and a contour interval of 10 or 20 feet.

See "Surface Water Records of Michigan, 1963" (p.218), "___ 1964" (p.220); "Water Resources Data for Michigan, 1979" (p.470), "___ 1980" (p.561) for listing of previous measurements.

See "Water Resources Data for Michigan, 1980" (p.563-580), "___ 1981" (p.460-476) for chemical analyses of samples collected at these stations.

Stream	Location	Drainage area (mi^2)	Measured discharge (ft^3/s)	Cfs per square mile	Measured discharge (ft^3/s)	Cfs per square mile
			Oct. 1, 2, 1980		July 14, 15, 1981	
Big Creek	Lat 46°24'07", long 87°20'47", in NE¼ sec.7, T.46 N., R.24 W., Marquette County, 0.4 mile upstream from mouth of Peterson Creek, 3 miles southeast of Sands, and 4.3 miles northeast of Sands Station.	4.60	9.70	2.11	9.19	2.00
Peterson Creek	Lat 46°24'59", long 87°24'22", in NW¼ NW¼ sec.2, T.46 N., R.25 W., Marquette County, at old County Road 553, 0.3 mile south of Sands.	2.93	0	0	0	0
do	Lat 46°24'44", long 87°21'53", in SW¼ NW¼ sec.6, T.46 N., R.24 W., Marquette County, at point where trail road nears stream, 2.0 miles east of Sands and 3.9 miles northeast of Sands Station.	5.38	2.53	.47	2.02	.38
Norby Creek	Lat 46°24'07", long 87°21'38", in NE¼ NW¼ sec.7, T.46 N., R.24 W., Marquette County, at logging bridge 1,000 ft upstream from old trail crossing, 2.5 miles southeast of Sands.	1.41	.14	.10	--	--
Peterson Creek[a]	Lat 46°24'21", long 87°20'38", in SW¼ SW¼ sec.5, T.46 N., R.24 W., Marquette County, 150 ft downstream from old bridge crossing, about 500 ft upstream from mouth and 3.2 miles east of Sands.	7.24	2.89	.40	2.41	.33
Big Creek[a]	Lat 46°24'43", long 87°19'57", in NW¼ SE¼ sec.5, T.46 N., R.24 W., Marquette County, at abandoned road crossing, 0.7 mile downstream from mouth of Peterson Creek and 3.6 miles east of Sands.	14.4	15.25	1.06	15.46	1.07
do	Lat 46°25'38", long 87°20'06", in SW¼ NE¼ sec.32, T.47 N., R.24 W., Marquette County, at twin culverts on Karen Road, 3.5 miles east of Sands and 2.6 miles southwest of Green Garden.	15.8	23.78	1.50	--	--
do	Gaging Station near Harvey (04044563).	17.0	28.54	1.68	28.38	1.67
do[a]	Lat 46°27'55", long 87°19'07", in SE¼ SW¼ sec.16, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 1 mile upstream from mouth, 2.5 miles southeast of Harvey and 0.2 mile northwest of Beaver Grove.	24.0	40.16	1.67	36.98	1.54
Cedar Creek[a]	Lat 46°26'11", long 87°24'20", in SW¼ SW¼ sec.26, T.47 N., R.25 W., Marquette County, at headwaters, 0.3 mile east of old County Road 553 and 1.2 miles north of Sands.	5.44	.26	.05	.25	.05

See footnotes at end of the table

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites.

STREAMS TRIBUTARY TO LAKE SUPERIOR

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
04044554 - BIG C NR SANDS STATION, MI (LAT 46 24 07 LONG 087 20 47)											
JUL , 1981											
14...	1200	9.2	171	8.1	11.0	10.4	96	89	7	27	5.2
04044557 - PETERSON C NR SANDS STATION, MI (LAT 46 24 44 LONG 087 21 53)											
JUL , 1981											
14...	1000	2.0	177	7.7	8.0	11.3	99	84	10	26	4.7
04044560 - BIG C NR SANDS, MI (LAT 46 24 43 LONG 087 19 57)											
JUL , 1981											
15...	1015	16	174	7.9	9.0	10.3	91	86	12	26	5.2
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)											
JUL , 1981											
15...	1130	28	171	8.1	9.0	11.0	97	88	13	26	5.7
04044572 - CEDAR C NR GENTIAN, MI (LAT 46 27 08 LONG 087 22 46)											
JUL , 1981											
14...	1340	10	149	8.0	9.5	10.8	96	71	5	21	4.4
04044573 - CEDAR C NR HARVEY, MI (LAT 46 27 20 LONG 087 21 42)											
JUL , 1981											
14...	1150	12	146	7.7	9.0	11.0	97	71	0	21	4.6
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)											
JUL , 1981											
14...	1015	5.6	222	7.7	8.0	10.7	93	110	20	31	6.8

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SODIUM, DIS- SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE FET-FLD (MG/L AS HCO3)	CAR- BONATE FET-FLD (MG/L AS CO3)	ALKA- LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)										
JUL , 1981 14...	1.5	4	.1	.6	100	0	82	1.3	5.9	1.6
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)										
JUL , 1981 14...	1.2	3	.1	.6	90	0	74	2.9	7.2	2.2
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)										
JUL , 1981 15...	1.4	3	.1	.7	90	0	74	1.8	5.5	1.2
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)										
JUL , 1981 15...	1.7	4	.1	.7	92	0	75	1.2	5.4	.9
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)										
JUL , 1981 14...	2.2	6	.1	.6	80	0	66	1.3	4.3	3.2
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)										
JUL , 1981 14...	2.0	6	.1	.6	86	0	71	2.7	4.2	2.4
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)										
JUL , 1981 14...	3.5	7	.1	.7	110	0	90	3.5	10	6.2

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)										
JUL , 1981 14...	106	.14	2.6	<.010	.50	.010	<.010	.03	<.010	1
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)										
JUL , 1981 14...	100	.14	.54	<.010	.55	.010	.010	.03	.010	1
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)										
JUL , 1981 15...	104	.14	4.4	<.010	.48	<.010	<.010	.03	<.010	2
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)										
JUL , 1981 15...	101	.14	7.7	<.010	.48	<.010	.010	.03	<.010	2
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)										
JUL , 1981 14...	93	.13	2.5	<.010	.04	<.010	<.010	.03	<.010	1
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)										
JUL , 1981 14...	90	.12	3.0	<.010	.10	.010	.010	.03	<.010	2
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)										
JUL , 1981 14...	125	.17	1.9	<.010	.11	<.010	<.010	.03	<.010	1

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	ZINC, DIS- SOLVED (UG/L AS ZN)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)										
JUL , 1981 14...	30	<1	10	0	<10	20	1	2	.1	<4
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)										
JUL , 1981 14...	30	<1	40	0	<10	180	2	<1	.1	5
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)										
JUL , 1981 15...	30	<1	<10	0	<10	10	2	<1	<.1	7
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)										
JUL , 1981 15...	30	<1	40	0	<10	<10	3	<1	<.1	<4
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)										
JUL , 1981 14...	30	<1	10	0	<10	<10	1	<1	<.1	<4
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)										
JUL , 1981 14...	30	<1	<10	0	<10	<10	1	<1	<.1	5
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)										
JUL , 1981 14...	40	<1	<10	0	<10	<10	2	1	.5	8

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)											
JUL , 1981											
15...	0900	9.7	211	8.0	7.0	10.4	88	100	10	30	6.8
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)											
JUL , 1981											
15...	1000	19	198	8.0	8.0	11.2	97	95	5	28	6.1
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)											
JUL , 1981											
15...	1120	25	192	8.0	9.0	11.2	98	93	3	27	6.2
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)											
JUL , 1981											
14...	1445	3.2	198	8.1	8.0	11.4	99	100	2	30	6.7
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)											
JUL , 1981											
14...	1540	2.1	200	8.1	9.0	10.8	96	100	2	30	6.6
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)											
JUL , 1981											
15...	0905	8.8	222	8.0	8.0	11.2	97	110	3	32	7.5

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE FET-FLD (MG/L AS HCO3)	CAR-BONATE FET-FLD (MG/L AS CO3)	ALKA-LINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)										
JUL , 1981 15...	3.3	6	.1	.7	110	0	90	1.8	8.9	5.7
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)										
JUL , 1981 15...	2.5	5	.1	.7	110	0	90	1.8	7.4	3.8
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)										
JUL , 1981 15...	3.5	8	.2	.8	110	0	90	1.8	6.4	3.9
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)										
JUL , 1981 14...	1.5	3	.1	.6	120	0	98	1.5	4.8	3.3
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)										
JUL , 1981 14...	1.4	3	.1	.6	120	0	98	1.5	4.5	3.2
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)										
JUL , 1981 15...	1.6	3	.1	.7	130	0	107	2.1	5.5	2.9

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)										
JUL , 1981 15...	126	.17	3.3	<.010	.10	<.010	<.010	.03	<.010	2
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)										
JUL , 1981 15...	107	.15	5.5	<.010	.08	.020	.010	.03	<.010	1
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)										
JUL , 1981 15...	105	.14	7.2	<.010	.15	.020	.030	.09	.010	2
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)										
JUL , 1981 14...	117	.16	1.0	<.010	.15	.010	<.010	.03	<.010	1
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)										
JUL , 1981 14...	116	.16	.66	<.010	.15	.010	.010	.03	.010	1
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)										
JUL , 1981 15...	124	.17	3.0	<.010	.18	.010	<.010	.03	<.010	1

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	ZINC, DIS- SOLVED (UG/L AS ZN)
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)										
JUL , 1981 15...	30	<1	20	0	<10	<10	1	<1	.1	7
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)										
JUL , 1981 15...	40	<1	10	0	<10	<10	1	2	.2	<4
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)										
JUL , 1981 15...	40	<1	20	0	<10	<10	2	4	.2	7
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)										
JUL , 1981 14...	30	<1	<10	0	<10	<10	1	<1	.1	10
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)										
JUL , 1981 14...	30	<1	10	0	<10	<10	1	<1	.1	4
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)										
JUL , 1981 15...	40	<1	10	0	<10	<10	1	1	.2	<4

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
04145000 - SHIAWASSEE RIVER NEAR FERGUS, MICH. . (LAT 43 15 17 LONG 084 06 20)											
JUN , 1980											
09...	1000	672	590	7.5	17.5	35	.70	8.2	87	250	41
AUG											
14...	1400	161	700	7.4	23.0	22	4.2	8.7	102	300	69
MAY , 1981											
29...	1415	295	708	8.2	17.5	20	6.7	8.4	89	300	--
04145500 - BAD RIVER NEAR BRANT, MICH. . (LAT 43 17 48 LONG 084 13 46)											
JUN , 1980											
11...	1400	205	700	7.8	12.0	20	6.9	8.2	80	320	120
AUG											
13...	1820	15	810	7.3	19.5	20	15	8.3	91	370	150
JUN , 1981											
01...	1600	15	744	8.1	20.0	20	1.2	10.4	114	370	--
04145600 - BAD RIVER AT ST. CHARLES, MI. (LAT 43 18 08 LONG 084 08 38)											
JUN , 1980											
10...	1300	550	520	7.5	11.5	40	.55	8.0	79	250	170
AUG											
13...	1130	18	713	7.4	20.0	25	40	6.5	66	380	140
JUN , 1981											
02...	0930	15	744	8.0	16.5	20	18	7.3	75	370	--
04145650 - SOUTH FORK BAD RIVER NR BRANT, MI. (LAT 43 15 33 LONG 084 12 32)											
JUN , 1980											
11...	1000	26	640	7.7	11.5	50	4.5	8.8	86	290	93
AUG											
14...	1200	22	710	7.4	19.5	60	9.8	6.5	71	290	100
JUN , 1981											
01...	1230	11	666	7.9	17.0	42	15	7.8	81	330	--
04145655 - POTATOE CREEK NR BRANT, MI. (LAT 43 15 42 LONG 084 12 33)											
JUN , 1980											
11...	1130	36	430	7.7	11.0	80	4.0	8.6	83	210	77
AUG											
14...	1030	19	648	7.0	19.0	55	10	7.0	76	320	100
JUN , 1981											
01...	1345	4.5	484	7.8	17.5	70	9.1	7.7	81	250	--
04145700 - SOUTH FORK BAD RIVER AT ST. CHARLES, MICHIGAN (LAT 43 17 54 LONG 084 08 32)											
JUN , 1980											
10...	0900	139	455	7.8	10.0	75	1.8	6.4	58	220	36
AUG											
13...	0910	77	616	7.1	19.0	55	22	6.0	65	280	90
JUN , 1981											
02...	1030	17	559	7.6	17.0	45	24	6.7	70	300	--
04145730 - BEAVER CREEK NR NELSON, MI. (LAT 43 20 13 LONG 084 13 44)											
JUN , 1980											
11...	1500	97	740	7.8	13.0	15	4.0	10.0	102	350	150
AUG											
14...	0900	4.4	820	7.5	19.0	15	15	6.4	69	370	130
JUN , 1981											
01...	1715	8.6	777	8.0	20.0	13	2.4	10.8	121	370	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)
04145000 - SHIAWASSEE RIVER NEAR FERGUS, MICH. , (LAT 43 15 17 LONG 084 06 20)											
JUN , 1980											
09...	66	21	17	13	.5	2.4	210	40	32	.3	6.4
AUG											
14...	77	26	28	17	.7	3.4	230	50	47	.3	7.9
MAY , 1981											
29...	75	27	28	17	.7	2.7	--	46	40	.2	.7
04145500 - BAD RIVER NEAR BRANT, MICH. , (LAT 43 17 48 LONG 084 13 46)											
JUN , 1980											
11...	88	24	9.2	6	.2	3.2	200	59	43	.2	7.3
AUG											
13...	102	27	15	8	.3	4.2	250	77	52	.3	9.5
JUN , 1981											
01...	100	30	10	5	.2	2.9	--	76	47	.5	.7
04145600 - BAD RIVER AT ST. CHARLES, MI. (LAT 43 18 08 LONG 084 08 38)											
JUN , 1980											
10...	70	17	5.7	5	.2	3.3	135	40	32	.2	7.0
AUG											
13...	107	28	15	8	.3	3.9	260	72	53	.3	9.6
JUN , 1981											
02...	100	30	10	5	.2	3.0	--	72	47	.2	1.0
04145650 - SOUTH FORK BAD RIVER NR BRANT, MI. (LAT 43 15 33 LONG 084 12 32)											
JUN , 1980											
11...	81	22	13	9	.3	2.8	200	66	37	.3	6.0
AUG											
14...	83	21	10	7	.3	3.1	190	69	30	.3	11
JUN , 1981											
01...	87	27	22	13	.5	2.4	--	72	40	.2	3.8
04145655 - POTATOE CREEK NR BRANT, MI. (LAT 43 15 42 LONG 084 12 33)											
JUN , 1980											
11...	60	14	6.4	6	.2	2.4	130	51	19	.2	7.2
AUG											
14...	88	25	17	10	.4	3.3	220	63	41	.3	13
JUN , 1981											
01...	70	19	10	8	.3	2.3	--	64	23	.2	5.0
04145700 - SOUTH FORK BAD RIVER AT ST. CHARLES, MICHIGAN (LAT 43 17 54 LONG 084 08 32)											
JUN , 1980											
10...	61	16	7.0	6	.2	2.6	130	46	24	.2	7.0
AUG											
13...	76	22	13	9	.3	3.8	190	57	34	.3	12
JUN , 1981											
02...	70	30	10	7	.3	2.4	--	66	35	.2	5.0
04145730 - BEAVER CREEK NR NELSON, MI. (LAT 43 20 13 LONG 084 13 44)											
JUN , 1980											
11...	100	25	6.9	4	.2	3.0	200	61	50	.2	6.5
AUG											
14...	99	31	16	8	.4	5.0	240	64	64	.2	5.2
JUN , 1981											
01...	100	30	10	5	.2	4.2	--	74	60	.2	.7

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)
04145000 - SHIAWASSEE RIVER NEAR FERGUS, MICH. , (LAT 43 15 17 LONG 084 06 28)											
JUN , 1980 09...	--	311	.42	504	2.2	.040	2.2	.110	1.6	1.70	3.9
AUG 14...	409	378	.56	176	.71	.030	.74	.100	1.4	1.50	2.2
MAY , 1981 29...	390	370	.53	311	.72	.040	.76	.070	.84	.91	1.7
04145500 - BAD RIVER NEAR GRANT, MICH. , (LAT 43 17 48 LONG 084 13 46)											
JUN , 1980 11...	--	354	.48	198	13	.040	13	.050	.87	.92	14
AUG 13...	520	448	.71	22.0	2.8	.020	2.8	.040	.77	.81	3.6
JUN , 1981 01...	598	411	.81	25.3	4.4	.040	4.4	.030	.84	.87	5.3
04145600 - BAD RIVER AT ST. CHARLES, MI. (LAT 43 18 08 LONG 084 08 38)											
JUN , 1980 10...	415	263	.56	618	13	.120	13	.060	1.3	1.40	14
AUG 13...	562	451	.76	28.5	2.5	.020	2.5	.030	.62	.65	3.2
JUN , 1981 02...	564	414	.77	22.8	4.8	.030	4.8	.070	1.1	1.20	6.0
04145650 - SOUTH FORK BAD RIVER NR GRANT, MI. (LAT 43 15 33 LONG 084 12 32)											
JUN , 1980 11...	--	349	.47	24.9	3.0	.030	3.0	.020	.71	.73	3.7
AUG 14...	420	342	.57	25.3	2.0	.020	2.0	.020	.91	.93	2.9
JUN , 1981 01...	456	399	.62	13.8	1.5	.040	1.5	.090	1.0	1.10	2.6
04145655 - POTATOE CREEK NR GRANT, MI. (LAT 43 15 42 LONG 084 12 33)											
JUN , 1980 11...	--	239	.33	23.7	2.6	.020	2.6	.040	1.3	1.30	3.9
AUG 14...	447	383	.61	22.9	1.7	.030	1.7	.030	1.1	1.10	2.8
JUN , 1981 01...	396	303	.54	4.8	1.3	.030	1.3	.060	1.1	1.20	2.5
04145700 - SOUTH FORK BAD RIVER AT ST. CHARLES, MICHIGAN (LAT 43 17 54 LONG 084 08 32)											
JUN , 1980 10...	321	223	.44	128	3.0	.040	3.0	.060	1.4	1.50	4.5
AUG 13...	398	332	.54	82.9	1.7	.030	1.7	.040	1.1	1.10	2.8
JUN , 1981 02...	498	345	.68	22.9	1.4	.040	1.4	.100	1.1	1.20	2.6
04145730 - BEAVER CREEK NR NELSON, MI. (LAT 43 20 13 LONG 084 13 44)											
JUN , 1980 11...	--	373	.51	98.5	17	.080	17	.020	.82	.84	18
AUG 14...	534	429	.73	6.3	1.7	.020	1.7	.100	.79	.89	2.6
JUN , 1981 01...	523	411	.71	12.2	4.6	.060	4.7	.050	1.2	1.20	5.9

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	BORON, TOTAL RECOVERABLE (UG/L AS B)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)
04145000 - SHIAWASSEE RIVER NEAR FERGUS, MICH. . (LAT 43 15 17 LONG 084 06 20)										
JUN , 1980 09...	17	.220	.070	250	3	100	0	100	0	10
AUG 14...	9.9	.180	.090	230	2	100	0	130	0	10
MAY , 1981 29...	7.4	.070	.040	400	2	100	0	100	1	10
04145500 - BAD RIVER NEAR BRANT, MICH. . (LAT 43 17 48 LONG 084 13 46)										
JUN , 1980 11...	62	.130	.060	10	1	100	0	70	0	10
AUG 13...	16	.100	.060	150	1	200	0	100	0	<10
JUN , 1981 01...	23	.060	.020	90	1	100	0	100	1	10
04145600 - BAD RIVER AT ST. CHARLES, MI. (LAT 43 18 08 LONG 084 08 38)										
JUN , 1980 10...	64	.180	.050	0	2	50	0	70	0	<10
AUG 13...	14	.240	.030	470	2	<50	0	90	0	20
JUN , 1981 02...	27	.070	.030	680	2	100	10	50	1	10
04145650 - SOUTH FORK BAD RIVER NR BRANT, MI. (LAT 43 15 33 LONG 084 12 32)										
JUN , 1980 11...	17	.060	.010	40	1	100	0	70	0	10
AUG 14...	13	.060	.000	110	1	--	0	110	0	<10
JUN , 1981 01...	12	.070	.080	440	2	100	20	110	1	10
04145655 - POTATOE CREEK NR BRANT, MI. (LAT 43 15 42 LONG 084 12 33)										
JUN , 1980 11...	17	.050	.010	0	1	<50	0	10	0	10
AUG 14...	12	.080	.010	190	2	<50	0	130	0	10
JUN , 1981 01...	11	.080	.030	290	2	100	0	70	1	20
04145700 - SOUTH FORK BAD RIVER AT ST. CHARLES, MICHIGAN (LAT 43 17 54 LONG 084 08 32)										
JUN , 1980 10...	20	.080	.000	40	2	100	0	120	0	<10
AUG 13...	12	.100	.020	350	2	100	0	120	0	<10
JUN , 1981 02...	12	.080	.030	680	2	100	0	60	1	10
04145730 - BEAVER CREEK NR NELSON, MI. (LAT 43 20 13 LONG 084 13 44)										
JUN , 1980 11...	79	.060	.050	20	1	<50	0	140	0	10
AUG 14...	11	.070	.020	100	1	<50	0	110	0	10
JUN , 1981 01...	26	.050	<.010	210	1	100	10	50	1	10

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
04145000 - SHIAWASSEE RIVER NEAR FERGUS, MICH. , (LAT 43 15 17 LONG 084 06 20)										
JUN , 1980										
09...	0	7	3000	3000	30	11	10	180	160	1
AUG										
14...	0	3	1200	1200	0	6	10	90	80	10
MAY , 1981										
29...	4	5	880	870	10	6	10	60	50	10
04145500 - BAD RIVER NEAR BRANT, MICH. , (LAT 43 17 48 LONG 084 13 46)										
JUN , 1980										
11...	0	5	1100	890	210	3	0	30	20	10
AUG										
13...	0	2	780	750	30	0	10	50	20	30
JUN , 1981										
01...	1	5	280	270	10	2	10	20	10	10
04145600 - BAD RIVER AT ST. CHARLES, MI. (LAT 43 18 08 LONG 084 08 38)										
JUN , 1980										
10...	0	5	2700	2700	30	3	10	40	30	7
AUG										
13...	0	4	2200	2200	30	2	10	10	0	30
JUN , 1981										
02...	1	5	1400	1400	10	4	10	60	30	30
04145650 - SOUTH FORK BAD RIVER NR BRANT, MI. (LAT 43 15 33 LONG 084 12 32)										
JUN , 1980										
11...	1	5	1200	1100	100	9	0	70	30	40
AUG										
14...	0	4	770	650	120	3	10	80	30	50
JUN , 1981										
01...	6	5	1300	1300	50	4	10	130	30	100
04145655 - POTATOE CREEK NR BRANT, MI. (LAT 43 15 42 LONG 084 12 33)										
JUN , 1980										
11...	0	4	620	390	230	3	0	40	10	30
AUG										
14...	0	3	980	880	100	3	10	70	20	50
JUN , 1981										
01...	1	2	1200	500	700	3	10	130	30	100
04145700 - SOUTH FORK BAD RIVER AT ST. CHARLES, MICHIGAN (LAT 43 17 54 LONG 084 08 32)										
JUN , 1980										
10...	0	3	1100	1100	10	3	10	40	30	10
AUG										
13...	0	3	1300	1200	90	1	10	80	50	30
JUN , 1981										
02...	1	6	1700	1700	50	4	10	160	60	100
04145730 - BEAVER CREEK NR NELSON, MI. (LAT 43 20 13 LONG 084 13 44)										
JUN , 1980										
11...	0	4	350	340	10	2	10	20	10	6
AUG										
14...	0	3	670	640	30	0	10	50	30	20
JUN , 1981										
01...	1	7	490	480	10	3	10	20	10	10

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	STRON-TIUM, TOTAL RECOV-ERABLE (UG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
04145000 - SHIAWASSEE RIVER NEAR FERGUS, MICH. . (LAT 43 15 17 LONG 084 06 20)										
JUN , 1980 09...	.1	3	0	0	150	40	11	--	.00	1
AUG 14...	<.1	4	0	0	220	20	9.7	--	.00	0
MAY , 1981 29...	<.1	1	0	0	200	30	9.0	.4	<.01	0
04145500 - BAD RIVER NEAR BRANT, MICH. . (LAT 43 17 48 LONG 084 13 46)										
JUN , 1980 11...	.2	0	1	0	170	10	9.2	.4	.01	0
AUG 13...	<.1	3	0	0	360	10	11	.8	.01	4
JUN , 1981 01...	<.1	3	1	0	210	20	6.1	.7	<.01	0
04145600 - BAD RIVER AT ST. CHARLES, MI. (LAT 43 18 08 LONG 084 08 38)										
JUN , 1980 10...	.2	2	1	0	100	20	9.8	1.8	.00	0
AUG 13...	.1	3	0	0	320	20	10	1.1	.01	1
JUN , 1981 02...	<.1	4	1	0	220	20	6.5	1.5	<.01	0
04145650 - SOUTH FORK BAD RIVER NR BRANT, MI. (LAT 43 15 33 LONG 084 12 32)										
JUN , 1980 11...	.2	1	1	0	240	10	16	.4	.01	0
AUG 14...	.1	2	0	0	330	10	--	.5	.01	2
JUN , 1981 01...	<.1	4	0	0	300	30	10	1.2	<.01	0
04145655 - POTATOE CREEK NR BRANT, MI. (LAT 43 15 42 LONG 084 12 33)										
JUN , 1980 11...	.1	0	1	0	200	10	19	.7	.01	0
AUG 14...	.3	3	0	0	350	10	16	.5	.00	1
JUN , 1981 01...	<.1	3	0	0	220	30	15	1.2	<.01	0
04145700 - SOUTH FORK BAD RIVER AT ST. CHARLES, MICHIGAN (LAT 43 17 54 LONG 084 08 32)										
JUN , 1980 10...	.2	2	1	0	140	40	--	1.3	.00	2
AUG 13...	.1	3	0	0	320	20	21	.8	.00	1
JUN , 1981 02...	<.1	3	0	0	290	20	12	1.0	.02	0
04145730 - BEAVER CREEK NR NELSON, MI. (LAT 43 20 13 LONG 084 13 44)										
JUN , 1980 11...	.2	0	2	0	180	10	10	.2	.01	0
AUG 14...	.1	2	0	0	280	20	14	.7	.01	1
JUN , 1981 01...	<.1	3	1	5	180	20	5.9	.9	<.01	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
04145790 - BEAVER CREEK AT ST. CHARLES, MI. (LAT 43 18 38 LONG 084 08 32)											
JUN , 1980											
10...	1600	299	600	7.8	13.0	30	4.0	7.6	81	260	110
AUG											
13...	1700	3.0	810	6.8	20.0	26	15	3.6	40	370	110
JUN , 1981											
02...	0830	--	756	7.7	16.0	22	3.3	5.0	51	370	--
04145802 - PICKEREL CREEK NR FERGUS, MI. (LAT 43 16 08 LONG 084 07 44)											
JUN , 1980											
09...	1500	--	640	7.5	15.0	25	6.1	7.8	79	300	100
AUG											
14...	1630	3.2	810	7.4	21.0	18	8.5	8.4	94	370	88
MAY , 1981											
27...	1800	2.4	666	7.9	20.0	18	6.8	7.0	74	310	--
04145803 - PICKERAL CR NR ST CHARLES MI (LAT 43 17 36 LONG 084 06 39)											
JUN , 1980											
09...	1700	--	760	7.5	17.0	15	2.5	8.2	81	300	88
AUG											
13...	1430	--	778	7.1	22.0	25	55	4.7	54	320	110
MAY , 1981											
27...	1130	--	741	7.8	19.0	20	35	6.3	67	300	--
04145805 - WOLF CR NR NELSON MI (LAT 43 20 11 LONG 084 11 22)											
JUN , 1980											
10...	1830	4.9	800	7.8	17.0	20	2.5	8.8	96	330	160
AUG											
12...	1930	1.3	660	7.6	23.0	22	14	8.3	98	280	130
MAY , 1981											
29...	1145	1.4	627	7.7	19.0	28	24	10.4	114	280	--
04145806 - WOLF CREEK NR ST. CHARLES MI (LAT 43 18 57 LONG 084 06 45)											
JUN , 1980											
12...	1200	--	520	7.3	15.0	80	4.0	4.5	47	220	76
AUG											
13...	1540	--	853	6.7	18.5	55	19	2.3	24	350	97
MAY , 1981											
29...	1300	--	741	7.6	20.0	65	8.5	8.4	94	310	--
04145808 - SHIAWASSEE RIVER NR SWAN CREEK, MI (LAT 43 20 17 LONG 084 04 20)											
AUG , 1980											
12...	1040	269	648	7.2	20.0	30	45	5.2	58	280	83
MAY , 1981											
29...	1620	483	694	7.9	20.0	27	39	6.0	73	310	--
04145810 - BEAR CREEK NR FERGUS MI (LAT 43 15 19 LONG 084 05 18)											
JUN , 1980											
09...	1330	11	690	7.4	10.5	17	3.5	7.2	70	310	140
AUG											
14...	1520	2.0	950	7.3	21.0	25	24	5.0	56	420	110
JUN , 1981											
01...	1030	1.4	775	7.7	15.0	26	7.1	5.0	50	370	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)
04145790 - BEAVER CREEK AT ST. CHARLES, MI. (LAT 43 18 39 LONG 084 08 32)											
JUN , 1980 10...	72	19	7.3	6	.2	3.2	150	42	35	.2	7.3
AUG 13...	100	30	18	9	.4	4.6	260	59	62	.3	8.9
JUN , 1981 02...	100	30	10	5	.2	3.6	--	71	54	.2	1.0
04145802 - PICKEREL CREEK NR FERGUS, MI. (LAT 43 16 08 LONG 084 07 44)											
JUN , 1980 09...	78	26	17	11	.4	2.9	200	66	40	.3	6.8
AUG 14...	98	30	19	10	.4	3.9	280	66	43	.3	11
MAY , 1981 27...	79	28	22	13	.5	3.5	--	60	40	.3	5.3
04145803 - PICKERAL CR NR ST CHARLES MI (LAT 43 17 36 LONG 084 06 39)											
JUN , 1980 09...	70	30	30	18	.8	3.2	210	80	52	.3	7.0
AUG 13...	87	26	19	11	.5	4.2	250	60	47	.3	11
MAY , 1981 27...	74	28	33	19	.8	3.7	--	61	160	.3	2.6
04145805 - WOLF CR NR NELSON MI (LAT 43 20 11 LONG 084 11 22)											
JUN , 1980 10...	90	25	17	10	.4	3.0	170	130	43	.3	6.7
AUG 12...	71	25	23	15	.6	3.3	150	100	40	.3	4.3
MAY , 1981 29...	69	25	19	13	.5	2.9	--	100	28	.3	1.6
04145806 - WOLF CREEK NR ST. CHARLES MI (LAT 43 18 57 LONG 084 06 45)											
JUN , 1980 12...	60	16	23	19	.7	2.7	140	45	47	.2	7.3
AUG 13...	96	26	39	19	.9	3.7	250	44	93	.3	14
MAY , 1981 29...	85	24	26	15	.6	3.6	--	57	61	.2	2.4
04145808 - SHIAWASSEE RIVER NR SWAN CREEK, MI (LAT 43 20 17 LONG 084 04 20)											
AUG , 1980 12...	75	23	23	15	.6	3.6	210	49	46	.2	9.6
MAY , 1981 29...	80	26	32	18	.8	2.9	--	48	44	.2	1.7
04145810 - BEAR CREEK NR FERGUS MI (LAT 43 15 19 LONG 084 05 18)											
JUN , 1980 09...	84	24	12	8	.3	3.4	170	70	45	.2	7.8
AUG 14...	110	35	23	11	.5	4.8	310	62	60	.3	9.8
JUN , 1981 01...	94	33	23	12	.5	3.6	--	90	54	.2	2.4

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)
04145790 - BEAVER CREEK AT ST. CHARLES, MI. (LAT 43 18 38 LONG 084 08 32)											
JUN , 1980 10...	--	276	.38	223	22	.120	22	.050	1.3	1.30	23
AUG 13...	520	439	.71	4.2	.58	.030	.61	.080	.73	.81	1.4
JUN , 1981 02...	558	408	.76	--	4.6	.110	4.7	.110	.99	1.10	5.8
04145802 - PICKEREL CREEK NR FERGUS, MI. (LAT 43 16 08 LONG 084 07 44)											
JUN , 1980 09...	--	357	.49	--	7.7	.050	7.7	.020	1.1	1.10	8.8
AUG 14...	527	442	.72	4.6	2.3	.010	2.3	.000	.75	.75	3.1
MAY , 1981 27...	469	340	.64	3.1	2.5	.070	2.6	.070	.67	.74	3.3
04145803 - PICKERAL CR NR ST CHARLES MI (LAT 43 17 36 LONG 084 06 39)											
JUN , 1980 09...	478	399	.65	--	3.0	.100	3.1	.140	1.1	1.20	4.3
AUG 13...	495	416	.67	--	2.4	.050	2.4	.070	.68	.75	3.2
MAY , 1981 27...	692	507	.94	--	3.4	.080	3.5	.130	.77	.90	4.4
04145805 - WOLF CR NR NELSON MI (LAT 43 20 11 LONG 084 11 22)											
JUN , 1980 10...	--	417	.57	5.5	16	.090	16	.090	1.0	1.10	17
AUG 12...	398	357	.54	1.4	2.6	.040	2.6	.020	.65	.67	3.3
MAY , 1981 29...	440	342	.60	1.7	4.9	.150	5.0	.100	1.0	1.10	6.1
04145806 - WOLF CREEK NR ST. CHARLES MI (LAT 43 18 57 LONG 084 06 45)											
JUN , 1980 12...	--	286	.39	--	2.0	.080	2.1	.110	.99	1.10	3.2
AUG 13...	581	467	.79	--	.06	.010	.07	.080	.61	.69	.76
MAY , 1981 29...	490	398	.67	--	2.2	.070	2.3	.150	1.4	1.50	3.8
04145808 - SHIAWASSFE RIVER NR SWAN CREEK, MI (LAT 43 20 17 LONG 084 04 20)											
AUG , 1980 12...	432	359	.59	314	.91	.030	.94	.200	.70	.90	1.8
MAY , 1981 29...	459	385	.62	599	1.2	.070	1.3	.190	1.2	1.40	2.7
04145810 - HEAR CREEK NR FERGUS MI (LAT 43 15 19 LONG 084 05 18)											
JUN , 1980 09...	--	340	.46	10.5	14	.150	14	.120	.98	1.10	15
AUG 14...	576	491	.78	3.1	3.1	.040	3.1	.070	.93	1.00	4.1
JUN , 1981 01...	527	451	.72	2.0	3.6	.120	3.7	.170	.83	1.00	4.7

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	BORON, TOTAL RECOV-ERABLE (UG/L AS B)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
04145790 - BEAVER CREEK AT ST. CHARLES, MI. (LAT 43 18 38 LONG 084 08 32)										
JUN , 1980 10...	100	.100	.030	600	1	50	10	70	0	10
AUG 13...	6.3	.090	.060	50	1	100	0	110	0	<10
JUN , 1981 02...	26	.080	.020	280	2	100	10	20	1	20
04145802 - PICKEWEL CREEK NR FERGUS, MI. (LAT 43 16 08 LONG 084 07 44)										
JUN , 1980 09...	39	.050	.010	20	1	100	0	100	0	10
AUG 14...	14	.040	.010	100	3	100	0	130	0	--
MAY , 1981 27...	15	.060	.030	300	1	100	0	130	1	<10
04145803 - PICKERAL CR NR ST CHARLES MI (LAT 43 17 36 LONG 084 06 39)										
JUN , 1980 09...	19	.070	.010	0	2	100	0	120	0	10
AUG 13...	14	.110	.050	310	2	100	0	120	0	20
MAY , 1981 27...	19	.070	.030	770	1	100	0	100	1	<10
04145805 - WOLF CR NR NELSON MI (LAT 43 20 11 LONG 084 11 22)										
JUN , 1980 10...	76	.040	.000	1000	1	100	0	80	0	10
AUG 12...	14	.050	.000	210	1	100	0	110	0	<10
MAY , 1981 29...	27	.060	.010	1400	1	100	10	70	1	10
04145806 - WOLF CREEK NR ST. CHARLES MI (LAT 43 18 57 LONG 084 06 45)										
JUN , 1980 12...	14	.060	.030	0	1	<50	0	110	0	10
AUG 13...	3.4	.190	.110	240	1	<50	0	140	0	20
MAY , 1981 29...	17	.120	.080	600	1	100	10	100	1	10
04145808 - SHIAWASSEE RIVER NR SWAN CREEK, MI (LAT 43 20 17 LONG 084 04 20)										
AUG , 1980 12...	8.1	.400	.080	60	3	--	0	130	1	10
MAY , 1981 29...	12	.090	.100	1500	2	100	20	150	1	10
04145810 - BEAR CREEK NR FERGUS MI (LAT 43 15 19 LONG 084 05 18)										
JUN , 1980 09...	67	.120	.050	90	1	50	0	80	0	<10
AUG 14...	18	.100	.060	40	2	50	0	130	0	10
JUN , 1981 01...	21	.070	.030	330	2	100	10	110	1	10

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
04145790 - BEAVER CREEK AT ST. CHARLES, MI. (LAT 43 18 38 LONG 084 08 32)										
JUN , 1980 10...	1	5	810	780	30	4	10	30	20	6
AUG 13...	0	1	260	190	70	0	10	60	10	50
JUN , 1981 02...	1	4	530	500	30	4	10	70	0	70
04145802 - PICKEREL CREEK NR FERGUS, MI. (LAT 43 16 08 LONG 084 07 44)										
JUN , 1980 09...	0	3	540	500	40	0	10	30	10	20
AUG 14...	0	4	490	450	40	2	10	30	10	20
MAY , 1981 27...	1	5	1200	1200	20	1	10	40	10	30
04145803 - PICKERAL CR NR ST CHARLES MI (LAT 43 17 36 LONG 084 06 39)										
JUN , 1980 09...	0	4	1300	1300	10	21	10	40	30	10
AUG 13...	0	3	1800	1800	40	1	10	60	40	20
MAY , 1981 27...	1	4	1200	1200	40	1	10	70	40	30
04145805 - WOLF CR NR NELSON MI (LAT 43 20 11 LONG 084 11 22)										
JUN , 1980 10...	1	5	1700	1700	10	2	10	70	40	30
AUG 12...	0	2	830	800	30	0	10	30	20	10
MAY , 1981 29...	2	6	2100	2100	10	2	10	90	50	40
04145806 - WOLF CREEK NR ST. CHARLES MI (LAT 43 18 57 LONG 084 06 45)										
JUN , 1980 12...	0	4	740	420	320	2	10	40	10	30
AUG 13...	0	2	910	750	160	2	10	120	20	100
MAY , 1981 29...	1	4	1500	1300	230	1	10	120	30	90
04145808 - SHIAWASSEE RIVER NR SWAN CREEK, MI (LAT 43 20 17 LONG 084 04 20)										
AUG , 1980 12...	4	4	2600	2600	30	10	20	120	80	40
MAY , 1981 29...	1	7	3100	3100	10	5	10	150	100	50
04145810 - BEAR CREEK NR FERGUS MI (LAT 43 15 19 LONG 084 05 18)										
JUN , 1980 09...	0	4	790	220	570	1	10	30	0	30
AUG 14...	0	3	490	460	30	3	10	70	20	50
JUN , 1981 01...	3	4	1100	1100	20	7	10	160	0	160

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

04145790 - BEAVER CREEK AT ST. CHARLES, MI. (LAT 43 18 38 LONG 084 08 32)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
JUN , 1980 10...	.2	2	1	0	110	20	8.7	--	.01	1
AUG 13...	<.1	3	0	0	320	10	11	.3	.01	1
JUN , 1981 02...	<.1	3	1	0	200	20	6.9	.8	<.01	0

04145802 - PICKEREL CREEK NR FERGUS, MI. (LAT 43 16 08 LONG 084 07 44)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
JUN , 1980 09...	.2	1	2	0	310	20	12	--	.00	0
AUG 14...	.2	2	1	0	390	20	13	.2	.01	0
MAY , 1981 27...	<.1	2	1	0	420	30.	11	.4	<.01	3

04145803 - PICKERAL CR NR ST CHARLES MI (LAT 43 17 36 LONG 084 06 39)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
JUN , 1980 09...	.2	4	3	0	250	20	19	.9	.00	1
AUG 13...	.1	3	1	0	240	20	12	.5	.01	5
MAY , 1981 27...	<.1	3	1	0	290	50	5.7	.7	<.01	1

04145805 - WOLF CR NR NELSON MI (LAT 43 20 11 LONG 084 11 22)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
JUN , 1980 10...	.1	4	2	0	--	20	12	--	--	2
AUG 12...	.1	--	0	0	470	20	8.6	.3	.00	1
MAY , 1981 29...	<.1	1	0	0	360	30	7.3	--	<.01	0

04145806 - WOLF CREEK NR ST. CHARLES MI (LAT 43 18 57 LONG 084 06 45)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
JUN , 1980 12...	.1	1	0	0	240	10	20	.6	.01	0
AUG 13...	.1	2	1	0	280	20	18	1.0	.01	5
MAY , 1981 29...	<.1	2	0	0	250	30	13	1.0	<.01	0

04145808 - SHIAWASSEE RIVER NR SWAN CREEK, MI (LAT 43 20 17 LONG 084 04 20)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
AUG , 1980 12...	.1	3	0	0	230	20	3.4	.7	.01	5
MAY , 1981 29...	<.1	1	0	0	200	50	11	2.0	<.01	0

04145810 - BEAR CREEK NR FERGUS MI (LAT 43 15 19 LONG 084 05 18)

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
JUN , 1980 09...	.2	2	1	0	180	50	7.7	--	.00	1
AUG 14...	.2	2	1	0	290	20	16	--	.01	1
JUN , 1981 01...	<.1	3	1	0	290	30	6.4	.9	<.01	1

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
04145814 - SWAN CREEK AT SCHUMAKER RD NR GARFIELD, MI. (LAT 43 24 03 LONG 084 05 57)											
JUN , 1980											
11...	1830	81	740	7.6	16.0	25	16	8.0	85	350	150
AUG											
12...	1450	24	864	7.3	23.0	25	38	5.7	66	350	110
MAY , 1981											
29...	0845	31	783	7.9	18.0	20	55	5.8	63	350	--
04145816 - MARSH CREEK NR GARFIELD MI (LAT 43 21 56 LONG 084 10 22)											
JUN , 1980											
11...	1700	9.2	620	8.0	17.0	40	3.5	10.2	108	290	100
AUG											
12...	1800	3.9	690	7.3	21.0	50	11	9.1	102	320	96
MAY , 1981											
29...	1020	2.5	586	7.9	16.0	28	4.3	10.4	107	310	--
04145818 - SWAN CREEK NR GARFIELD MI (LAT 43 21 18 LONG 084 04 20)											
JUN , 1980											
12...	1000	154	650	7.5	15.0	35	37	--	--	310	110
AUG											
12...	1320	78	778	7.1	22.5	25	34	3.6	42	330	120
MAY , 1981											
29...	1740	100	763	7.9	21.0	20	28	5.6	63	330	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY FIELD (MG/L AS CACO3)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)
04145814 - SWAN CREEK AT SCHOMAKER RD NR GARFIELD, MI. (LAT 43 24 03 LONG 084 05 57)											
JUN , 1980 11...	98	25	16	9	.4	3.1	200	83	56	.3	5.0
AUG 12...	95	28	42	20	1.0	4.9	240	74	90	.3	7.7
MAY , 1981 29...	91	29	25	13	.6	3.5	--	77	59	.2	1.5
04145816 - MARSH CREEK NR GARFIELD MI (LAT 43 21 56 LONG 084 10 22)											
JUN , 1980 11...	83	21	9.7	7	.2	3.0	190	76	31	.2	5.4
AUG 12...	87	24	15	9	.4	5.9	220	65	34	.3	13
MAY , 1981 29...	82	26	15	9	.4	4.5	--	72	30	.2	2.5
04145818 - SWAN CREEK NR GARFIELD MI (LAT 43 21 18 LONG 084 04 20)											
JUN , 1980 12...	85	24	15	9	.4	3.0	200	64	45	.2	5.8
AUG 12...	89	26	23	13	.6	3.9	240	62	56	.3	9.1
MAY , 1981 28...	89	27	22	12	.5	3.3	--	73	54	.2	2.8

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)
04145814 - SWAN CREEK AT SCHUMAKER RD NR GARFIELD, MI. (LAT 43 24 03 LONG 084 05 57)											
JUN , 1980 11...	--	402	.55	89.0	9.7	.060	9.8	.060	1.1	1.20	11
AUG 12...	570	486	.78	36.9	.83	.030	.86	.160	.84	1.00	1.9
MAY , 1981 29...	561	425	.76	47.6	3.9	.070	4.0	.180	1.3	1.50	5.5
04145816 - MARSH CREEK NR GARFIELD MI (LAT 43 21 56 LONG 084 10 22)											
JUN , 1980 11...	--	344	.47	8.6	7.1	.030	7.1	.040	1.1	1.10	8.2
AUG 12...	412	377	.56	4.4	1.7	.020	1.7	.060	.76	.82	2.5
MAY , 1981 29...	429	353	.58	2.9	3.3	.080	3.4	.090	1.4	1.50	4.9
04145818 - SWAN CREEK NR GARFIELD MI (LAT 43 21 18 LONG 084 04 20)											
JUN , 1980 12...	--	362	.49	151	6.7	.080	6.8	.070	1.5	1.60	8.4
AUG 12...	533	424	.72	113	1.1	.040	1.1	.340	.86	1.20	2.3
MAY , 1981 23...	492	410	.67	133	3.5	.110	3.6	.150	1.7	1.80	5.4

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	BORON, TOTAL RECOV-ERABLE (UG/L AS B)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
04145814 - SWAN CREEK AT SCHUMAKER RD NR GARFIELD, MI. (LAT 43 24 03 LONG 084 05 57)										
JUN , 1980 11...	49	.080	.040	30	1	<50	0	50	0	10
AUG 12...	8.2	.160	.010	600	1	200	0	140	0	<10
MAY , 1981 29...	24	.140	.060	2300	2	100	0	80	1	10
04145816 - MARSH CREEK NR GARFIELD MI (LAT 43 21 56 LONG 084 10 22)										
JUN , 1980 11...	36	.040	.040	0	1	<50	0	50	0	10
AUG 12...	11	.100	.090	180	1	<50	0	130	0	<10
MAY , 1981 29...	22	.070	.030	460	1	100	0	60	1	20
04145818 - SWAN CREEK NR GARFIELD MI (LAT 43 21 18 LONG 084 04 20)										
JUN , 1980 12...	37	.130	.040	10	2	100	0	100	0	10
AUG 12...	10	.320	.080	160	3	--	0	130	1	10
MAY , 1981 28...	24	1.20	.070	820	2	100	10	60	1	20

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY MISCELLANEOUS SITES

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
04145814 - SWAN CREEK AT SCHOMAKER RD NR GARFIELD, MI. (LAT 43 24 03 LONG 084 05 57)										
JUN , 1980										
11...	1	27	940	920	20	3	10	50	20	30
AUG										
12...	0	4	1700	1600	60	3	10	140	60	80
MAY , 1981										
29...	3	10	3500	3500	10	3	10	150	90	60
04145816 - MARSH CREEK NR GARFIELD MI (LAT 43 21 56 LONG 084 10 22)										
JUN , 1980										
11...	0	3	400	330	70	2	0	40	10	30
AUG										
12...	0	3	700	610	90	0	10	50	20	30
MAY , 1981										
29...	1	5	920	890	30	6	0	70	20	50
04145818 - SWAN CREEK NR GARFIELD MI (LAT 43 21 18 LONG 084 04 20)										
JUN , 1980										
12...	0	5	2100	2100	40	3	10	100	40	60
AUG										
12...	3	4	1600	1600	10	5	20	150	60	90
MAY , 1981										
28...	1	9	1400	1400	10	6	10	140	80	60

STREAMS TRIBUTARY TO LAKE HURON--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981--CONTINUED

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	STRON-TIUM, TOTAL RECOV-ERABLE (UG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
04145814 - SWAN CREEK AT SCHOMAKER RD NR GARFIELD, MI. (LAT 43 24 03 LONG 084 05 57)										
JUN , 1980 11...	<.1	2	2	0	310	10	13	.6	.01	0
AUG 12...	.1	2	0	0	500	20	16	1.5	.01	1
MAY , 1981 29...	.1	2	1	0	380	40	7.2	1.2	<.01	0
04145316 - MARSH CREEK NR GARFIELD MI (LAT 43 21 56 LONG 084 10 22)										
JUN , 1980 11...	.1	0	1	0	250	10	15	.3	.01	1
AUG 12...	<.1	2	0	0	350	20	17	.3	.01	3
MAY , 1981 29...	<.1	2	0	0	300	20	7.8	.3	<.01	30
04145819 - SWAN CREEK NR GARFIELD MI (LAT 43 21 18 LONG 084 04 20)										
JUN , 1980 12...	.1	2	2	0	270	10	15	1.5	.01	0
AUG 12...	.1	3	0	0	250	20	11	1.2	.00	4
MAY , 1981 28...	<.1	1	1	0	340	50	7.5	.3	<.01	0

462358087265301 - POWELL LAKE NEAR SANDS STATION, MI

DATE	TIME	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	NITROGEN DISSOLVED (MG/L AS N)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM
JUN												
05...	1300	2.00	31	6.8	22.0	.51	14	4	3.7	1.1	.7	10

DATE	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)
JUN												
05...	.1	.4	12	0	10	3.0	4.1	.5	<.1	34	.05	<.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
JUN												
05...	.01	.080	.10	.42	.50	<.010	<.010	280	190	90	20	6

462544087255201 - STRAWBERRY LAKE NEAR SANDS, MI

DATE	TIME	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	NITROGEN DISSOLVED (MG/L AS N)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM
SEP												
03...	1400	3.00	57	6.8	21.0	.40	25	3	7.0	1.8	.7	6

DATE	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)
SEP												
03...	.1	.3	27	0	22	6.5	3.2	.6	<.1	49	.07	<.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
SEP												
03...	.02	.040	.05	.34	.38	<.010	<.010	170	150	20	10	<10

462600087285801 - HARVEY LAKE NEAR PALMER, MI

DATE	TIME	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	NITROGEN DISSOLVED (MG/L AS N)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO
JUN 02...	1420	23	6.4	22.0	.57	8	1	2.3	.6	.8	17	.1

DATE	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
JUN 02...	.2	8	0	7	5.1	2.4	.5	<.1	22	.03	<.010	.02

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
JUN 02...	.040	.05	.51	.55	<.010	<.010	490	410	80	10	4

462859087260201 - PELISSIER LAKE NEAR MARQUETTE, MI

DATE	TIME	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	NITROGEN DISSOLVED (MG/L AS N)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM
AUG 31...	1135	3.00	102	7.6	20.5	.52	49	4	13	3.9	1.0	4

DATE	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE FET-FLD (MG/L AS HCO3)	CARBONATE FET-FLD (MG/L AS CO3)	ALKALINITY FIELD (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NITRITE DISSOLVED (MG/L AS N)
AUG 31...	.1	.6	55	0	45	2.2	6.4	.9	<.1	69	.09	<.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH4)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
AUG 31...	.04	.040	.05	.44	.48	<.010	<.010	300	260	40	10	<10

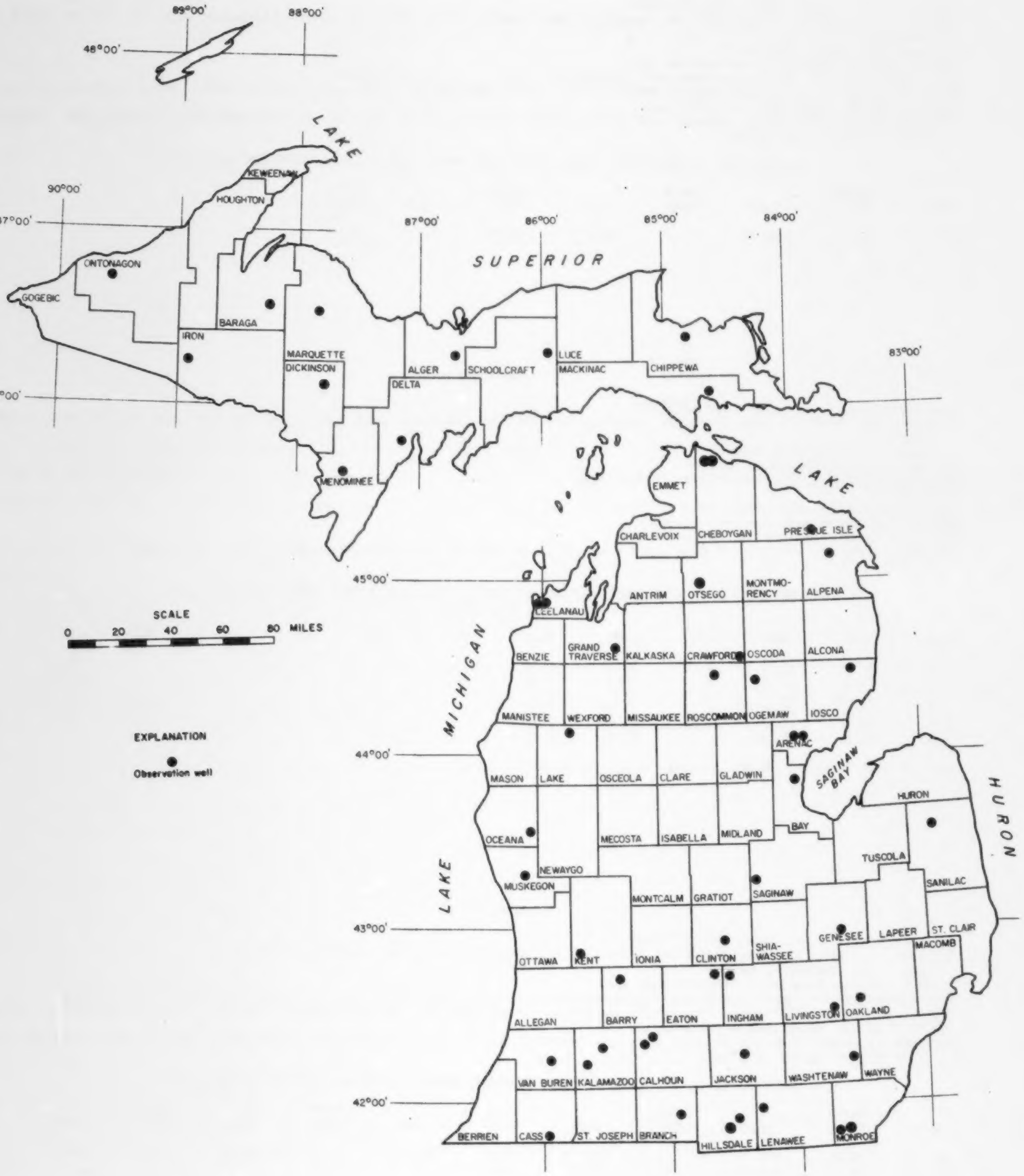
89°00'
88°00'
48°00'
LAKE SUPERIOR
90°00'
47°00'
87°00'
86°00'
85°00'
84°00'
83°00'
46°00'
45°00'
44°00'
43°00'
42°00'
KEWEENAW
HOUGHTON
ONTONAGON
GOGEBIC
BARAGA
IRON
MARQUETTE
DICKINSON
ALGER
DELTA
SCHOOLCRAFT
LUCE
MACKINAC
CHIPPEWA
MENOMINEE
LAKE HURON
LAKE MICHIGAN
EMMET
CHARLEVOIX
CHEBOYGAN
PRESQUE ISLE
ANTRIM
OTSEGO
MONTMO-RENCY
ALPENA
LEELANAU
BENZIE
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
MANISTEE
WEXFORD
MISSAUKEE
ROSCOMMON
OGEMAW
IOSCO
ARENAC
MASON
LAKE
OSCEOLA
CLARE
GLADWIN
SAGINAW BAY
HURON
OCEANA
MECOSTA
ISABELLA
MIDLAND
BAY
TUSCOLA
SANILAC
NEWAYGO
MUSKEGON
MONTCALM
GRATIOT
SAGINAW
GENESEE
LAPEER
ST. CLAIR
MACOMB
OTTAWA
KENT
IONIA
CLINTON
SHIA-WASSEE
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
OAKLAND
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
BERRIEN
CASS
ST. JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
SCALE
0 20 40 60 80 MILES
EXPLANATION
● Observation well

FIGURE 9.--Map showing location of observation wells published in this report.

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDB.
LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft (76 m) northwest of highway M-44, 0.2 mi (0.3 km) northeast of Kentucky.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 66 ft (20 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of casing, 3.60 ft (1.10 m) above land-surface datum.
PERIOD OF RECORD.--June 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft (1.94 m) below land-surface datum, June 29, 1960; lowest measured, 14.19 ft (4.33 m) Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	11.13	JAN 13	11.55	APR 8	11.09	JUL 9	10.80

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDDA.
LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi (5 km) east and 1.5 mi (2.4 km) north of Long Rapids.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in (15 cm), depth 88 ft (27 m), screened 79 to 88 ft (24 to 27 m).
DATUM.--Altitude of land-surface datum is 713 ft (217 m). Measuring point: Plywood instrument shelf, 217 ft (0.8 m) above land-surface.
REMARKS.--Bottom of hole near top of bedrock.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.75 ft (4.80 m) below land-surface datum, May 8, 1979; lowest, 28.73 ft (8.76 m) Mar. 10, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.45	25.44	26.37	28.33	27.45	--	--	--	--	--	23.04	--
10	24.52	25.66	26.42	28.45	27.37	--	--	--	--	--	23.33	--
15	24.75	25.77	26.47	28.35	27.34	--	--	--	--	--	23.58	25.01
20	24.88	25.85	26.77	28.07	27.13	--	--	--	--	23.99	23.88	25.24
25	24.97	26.07	26.86	27.69	26.63	--	--	--	--	22.35	24.16	25.48
EOM	25.28	26.19	27.01	27.55	26.26	--	--	--	--	--	--	25.68

WTR YEAR 1981 MAX 21.98 JUL 20, 1981 MIN 28.46 JAN 12, 1981

ARENAC COUNTY

440342083542801. Local number, 19N 5E 7DABA1.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi (5 km) northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 185 ft (56 m), screened 180 to 185 ft (55 to 56 m).
DATUM.--Altitude of land-surface datum is 667 ft (203 m). Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.28 ft (2.52 m) below land-surface datum, July 15, 1980; lowest measured, 10.09 ft (3.07 m) Nov. 12, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	10.04	JAN 21	9.54	MAR 4	9.26	MAY 21	9.27	AUG 12	9.59	SEP 17	9.81
NOV 12	10.09	FEB 18	9.46	APR 21	9.49	JUL 2	9.62				

ARENAC COUNTY

440342083542802. Local number, 19N 5E 7DABA2.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi (5 km) northeast of Omer.
Owner: U.S. Geological Survey
AQUIFER.--Lake bed sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 21 ft (6 m), screened 16 to 21 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 667 ft (203 m). Measuring point: Top of casing, 2.2 ft (0.67 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.57 ft (1.39 m) below land-surface datum, May 21, 1981; lowest measured, 6.92 ft (2.11 m) Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	6.89	JAN 21	6.66	MAR 4	6.21	MAY 21	4.57	AUG 12	5.95	SEP 17	5.67
NOV 12	6.80	FEB 18	6.91	APR 21	5.14	JUL 2	5.66				

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.
LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft (29 m) north of U.S. Highway 41 and 0.5 mi (0.8 km) southeast of Nestoria Road.
Owner: Michigan State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 10 ft (3 m), screened 7 to 10 ft (2 to 3 m).
DATUM.--Altitude of land-surface datum is 1,630 ft (497 m). Measuring point: Top of casing, 4.78 ft (1.46 m) above land-surface datum.
REMARKS.--Measurements made by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft (1.00 m) below land-surface datum, Apr. 30, 1965; lowest measured, 8.09 ft (2.47 m) Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 30	6.80	JAN 31	7.32	MAR 31	7.20	MAY 31	6.85	JUL 31	7.40	SEP 30	7.24
DEC 31	7.00	FEB 29	6.75	APR 30	6.30	JUN 30	6.66	AUG 31	7.38		

BARRY COUNTY

424540085232001. Local number, 4N 9W 5DAAA.
LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Solomon Road 4 mi (6 km) east and 3.5 mi (5.6 km) north of Middleville.
Owner: State Department of Natural Resources.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in (5 cm), depth 131 ft (40 m).
DATUM.--Altitude of land-surface datum is 860 ft (262 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--December 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.5 ft (34.0 m) below land-surface datum, Mar. 20, 1978; lowest measured, 122.0 ft (37.2 m) Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	LEVEL	DATE	LEVEL	DATE	LEVEL	DATE	LEVEL
DEC 22	117.2	JAN 26	117.2	MAY 13	116.9	AUG 24	116.1

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.

LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.
Owner: Pinconning Township.

AQUIFER.--Saginaw Formation of Pennsylvania age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 110 ft (33 m), cased to 60 ft (18 m), open end.

DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood shelter base, 2.00 ft (0.61 m) above land-surface datum.

REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--August 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.05 ft (0.02 m) below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft (3.21 m) Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	1.93	JAN 30	1.94	MAR 4	1.84	MAY 21	1.83	JUL 2	2.86	AUG 12	3.49
DEC 16	1.67	FEB 25	1.84	APR 21	1.98						

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.

LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.
Owner: City of Coldwater.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 113 ft (34 m), screened 73 to 113 ft (22 to 34 m).

DATUM.--Altitude of land-surface datum is 970 ft (296 m). Measuring point: Plywood shelter base, 2.50 ft (0.76 m) above land-surface datum.

REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--January 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft (2.7 m) below land-surface datum, May 6, 1975; lowest, 25.9 ft (7.9 m) May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.1	17.1	17.5	20.5	17.7	21.1	12.5	21.4	21.1	12.3	19.8	12.6
10	16.7	21.2	20.5	13.7	21.2	19.8	21.4	13.7	20.3	21.9	20.3	16.0
15	20.3	13.0	19.7	17.6	13.5	13.7	20.5	21.2	20.3	22.7	11.8	20.9
20	16.7	17.4	13.0	19.9	20.3	20.4	20.7	--	13.2	16.8	16.4	12.6
25	14.4	17.9	13.7	21.0	19.8	22.0	13.4	14.2	20.5	12.8	22.2	16.2
EOM	21.3	13.1	13.1	13.5	13.5	21.0	19.8	13.2	20.9	20.5	21.4	20.1

WTR YEAR 1981 MAX 10.4 AUG 2, 1981 MIN 22.7 JUL 15, 1981

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.

LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi (8 km) north of Battle Creek.
Owner: Rilla Sabin.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in (38 cm), depth 12 ft (4 m), open tile bottom.

DATUM.--Land-surface datum is 907.99 ft (2/5.76 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.50 ft (0.46 m) above land-surface datum.

REMARKS.--Measured by observer.

PERIOD OF RECORD.--September 1946 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft (0.27 m) below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	3.30	DEC 24	3.59	FEB 25	3.05	APR 22	3.35	JUN 17	3.24	AUG 12	3.80
8	3.30	31	3.66	MAR 4	3.10	29	3.10	24	3.32	19	3.94
15	3.50	JAN 7	3.70	11	3.30	MAY 6	3.20	JUL 1	3.50	26	4.10
22	3.60	14	3.76	18	3.44	13	3.14	8	3.54	SEP 2	4.08
29	3.70	21	3.80	25	3.52	20	3.10	15	3.70	9	4.06
NOV 28	3.98	29	3.90	APR 1	3.54	27	3.15	22	3.76	16	4.01
DEC 3	4.00	FEB 4	3.50	8	3.50	JUN 3	3.13	29	3.62	23	4.04
10	3.83	11	3.36	15	3.41	10	3.18	AUG 5	3.64	30	3.85
17	3.66	18	3.25								

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.
LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.
Owner: City of Battle Creek.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 127 ft (39 m), cased to 103 ft (31 m).
DATUM.--Land-surface datum is 830.79 ft (253.22 m) National Geodetic Vertical Datum of 1929. Measuring point: Recorder base, 2.10 ft (0.64 m) above land-surface datum.
REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.
PERIOD OF RECORD.--October 1939 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft (0.2 m) below land surface datum, Apr. 26-27, 1950; lowest, 16.75 ft (5.11 m) July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.10	7.35	7.00	--	7.90	6.40	6.20	6.70	6.30	9.02	7.35	6.80
10	7.35	7.20	8.10	--	7.30	6.50	6.75	5.60	5.90	7.80	6.90	6.90
15	7.00	7.35	9.00	--	7.40	5.70	6.10	5.90	6.40	6.30	8.40	7.60
20	7.30	7.95	7.80	--	5.80	5.70	5.30	6.10	7.30	8.60	8.70	6.50
25	7.00	8.60	6.80	--	7.10	6.80	6.50	6.60	6.04	7.60	5.90	6.30
EOM	7.90	7.80	6.80	--	5.90	7.20	5.70	6.80	7.50	7.00	8.00	5.40

CASS COUNTY

414651085575601. Local number, 8S 14W 17BAAA.
LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi (3 km) east of Adamsville on U.S. Highway 112.
Owner: Ted Little.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in (71 cm), depth 55 ft (17 m), cribbed with brick to open bottom.
DATUM.--Altitude of land-surface datum is 840 ft (256 m). Measuring point: Top of wooden platform, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft (14.08 m) below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	50.70	DEC 23	50.90	FEB 25	51.75	APR 23	51.10	JUN 23	49.70	AUG 25	50.10
NOV 24	50.75	JAN 23	51.30	MAR 25	51.60	MAY 26	50.95	JUL 27	50.00	SEP 26	49.20

CHEBOYGAN COUNTY

454427084424001. Local number, 39N 3W 29CBCB1.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.
Owner: U.S. Geological Survey
AQUIFER.--Dundee Formation of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 121 ft (37 m) cased to 104 ft (32 m), open end.
DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.25 ft (1.60 m) below land-surface datum, May 12, 1979; lowest measured, 11.68 ft (3.56 m) Feb. 11, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	11.23	JAN 5	11.36	MAR 19	9.14	JUN 2	7.89	AUG 12	10.55	SEP 9	11.19
DEC 2	11.32	FEB 11	11.68	APR 27	6.85	JUL 7	8.94				

CHEBOYGAN COUNTY

454427084424002. Local number, 39N 3W 29CBCB2.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 55 ft (17 m), screened 40 to 55 ft (12 to 17 m).
DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--February 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.07 ft (0.63 m) below land-surface datum, May 12, 1979; lowest measured, 6.47 ft (1.97 m) Feb. 11, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	5.88	JAN 5	6.20	MAR 19	5.00	JUN 2	3.97	AUG 12	5.66	SEP 9	6.02
DEC 2	6.08	FEB 11	6.47	APR 27	3.26	JUL 7	4.68				

CHIPPEWA COUNTY

462159084442201. Local number, 46N 4W 24DADA.
LOCATION.--Lat 46°21'59", long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi (0.3 km) south of highway M-28 and 1 mi (2 km) west of Raco.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 54 ft (16 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of shelter base, 3.07 ft (0.94 m) above land-surface datum.
PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft (5.61 m) below land-surface datum, June 7, 1971; lowest, 28.43 ft (8.67 m) Apr. 14, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.93	23.54	24.00	--	--	25.35	--	23.42	--	23.81	24.21	24.70
10	23.07	23.62	--	24.52	25.03	25.42	25.12	--	23.42	23.89	24.25	24.71
15	23.18	23.72	--	--	--	25.50	--	--	23.48	23.94	24.37	24.79
20	23.27	23.79	--	--	--	25.57	--	--	23.59	23.98	24.44	24.87
25	23.36	23.87	--	--	--	25.66	--	--	23.69	24.06	24.53	24.96
EOM	23.47	23.94	--	--	--	25.76	--	--	23.79	24.14	24.63	25.05

WTR YEAR 1981 MAX 22.81 OCT 1, 1980 MIN 25.80 MAR 3, 1981

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.
LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi (10 km) south of St. Johns.
Owner: State Highway Department.
AQUIFER.--Gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in (51 cm), depth 26 ft (8 m), screened 23 to 26 ft (7 to 8 m).
DATUM.--Land-surface datum is 803.32 ft (244.85 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.30 ft (0.40 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft (4.22 m) below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft (6.07 m) Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	18.82	DEC 22	18.83	FEB 23	18.50	APR 21	18.00	JUN 22	17.87	AUG 21	18.83
NOV 24	18.99	JAN 23	18.85	MAR 23	18.38	MAY 26	17.63	JUL 21	18.53	SEP 22	18.81

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.
LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi (4.2 km) south of Eldorado on Highway M-18.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 56 ft (17 m), cased.
DATUM.--Altitude of land-surface datum is 1,190 ft (363 m). Measuring point: Top of shelter base, 2.95 ft (0.90 m) above land-surface datum.
PERIOD OF RECORD.--November 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft (7.84 m) below land-surface datum, May 10, 1976; lowest, 35.97 ft (10.96 m) Apr. 4-6, 1951

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.75	30.87	30.98	31.22	31.38	--	31.52	31.15	30.31	30.01	29.95	--
10	30.75	30.93	31.00	31.25	31.43	--	31.49	31.05	30.20	30.00	29.91	--
15	30.77	30.93	31.00	31.27	31.48	--	31.46	30.91	30.13	30.00	29.88	--
20	30.78	30.93	31.14	31.31	31.50	31.60	31.38	30.77	30.13	30.00	--	29.65
25	30.79	30.96	31.15	31.32	--	31.62	31.29	30.62	30.07	30.00	--	29.71
EOM	30.83	30.96	31.16	31.38	--	36.54	31.23	30.46	30.04	30.00	--	29.75

WTR YEAR 1981 MAX 29.63 SEP 19, 1981 MIN 31.63 MAR 22, 1981

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.
LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi (5.6 km) east of Escanaba.
Owner: M. Blake
AQUIFER.--Munising Sandstone of Cambrian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in (13 cm), depth 530 ft (162 m).
DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of shelter base, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--July 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft (0.5 m) below land-surface datum, May 6, 1960; lowest, 8.9 ft (2.7 m) Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.99	6.22	6.15	6.18	6.47	5.98	5.46	5.24	5.49	5.80	5.91	6.26
10	6.02	6.27	6.15	6.34	6.44	5.97	5.50	5.26	5.58	6.06	5.96	6.10
15	6.08	6.22	6.17	6.32	--	5.88	5.53	5.29	5.62	6.26	5.96	6.01
20	6.06	6.21	6.21	6.36	6.31	5.92	5.41	5.43	5.51	6.14	6.15	6.09
25	6.20	6.19	6.21	6.31	6.10	5.90	5.19	5.42	5.55	6.28	6.30	6.22
EOM	6.17	6.14	6.21	6.44	5.96	5.74	5.26	5.57	5.68	6.55	6.09	6.21

WTR YEAR 1981 MAX 5.07 APR 24, 1981 MIN 6.60 AUG 2, 1981

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.
LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109, 6.25 mi (10.06 km) north of Felch.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter, 1¼ in (3.18 cm), depth 31 ft (9 m) screened 29 to 31 ft (8.8 to 9.4 m).
DATUM.--Altitude of land-surface datum is 1,160 ft (353 m). Measuring point: Hole in top of cap, 4.00 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--October 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft (3.99 m) below land-surface datum, May 17, 1972; lowest measured, 16.50 ft (5.03 m) Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATE LEVEL
OCT 21	14.70	DEC 18	15.11	MAR 4	15.35	MAY 27	14.22	AUG 6	14.05	SEP 2	14.45
NOV 12	14.84	JAN 21	15.39	APR 16	14.64	JUL 2	13.75				

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.
LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi (0.8 km) west of Lansing.
Owner: F. Wheeler.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 381 ft (116 m), cased to 140 ft (43 m).
DATUM.--Land-surface datum is 862.91 ft (263.01 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood instrument shelf, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft (20.6 m) below land-surface datum, Nov. 23, 1953; lowest, 103.6 ft (31.6 m) Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	87.00	94.80	97.16	81.90	86.03	85.30	83.48	85.87	94.58	94.72	91.16	89.78
10	93.32	96.12	96.74	84.36	87.83	84.50	83.16	85.70	96.18	98.75	89.67	90.73
15	92.97	96.47	90.20	84.50	88.49	85.18	84.87	85.77	89.14	99.30	96.66	--
20	92.83	97.25	90.62	85.39	85.44	89.01	87.00	89.41	88.67	98.32	96.39	--
25	93.64	96.95	87.04	85.50	83.38	91.02	87.77	91.03	88.75	96.38	99.92	--
EOM	95.06	95.11	82.60	86.35	84.64	85.46	89.22	93.18	94.05	90.97	97.11	--

WTR YEAR 1981 MAX 81.3 JAN 3, 1981 MIN 100.3 AUG 27, 1981

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.
LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.
Owner: General Motors Corporation.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in (25 cm), depth 385 ft (117 m), cased to 150 ft (46 m).
DATUM.--Land-surface datum is 837.0 ft (255.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Base for recorder, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.
PERIOD OF RECORD.--January 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level,52.3 ft (15.9 m) below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft (26.5 m) Jun. 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	62.33	60.21	61.85	67.99	65.24	64.03	62.14	57.43	64.73	68.05	68.03	64.96
10	61.29	60.15	63.34	68.62	64.49	63.98	62.59	57.57	64.30	72.58	67.13	62.77
15	61.11	61.38	61.78	67.56	65.54	63.63	62.35	57.27	62.92	72.12	68.28	62.77
20	60.50	62.38	61.80	65.43	65.29	63.52	62.42	58.67	64.80	71.99	68.08	61.29
25	60.54	61.59	63.49	64.87	65.71	62.96	58.92	60.67	62.60	71.77	72.41	61.38
EOM	60.21	61.65	64.02	65.19	65.73	63.00	57.41	63.38	68.34	66.30	66.98	60.45

WTR YEAR 1981 MAX 57.16 MAY 16, 1981 MIN 74.44 JUL 13, 1981

GRAND TRAVERSE COUNTY

443921085213501. Local number, 26N 9W 14ABAA.
LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi (8.8 km) north of Fife Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 80 ft (24 m), PVC pipe and screen.
DATUM.--Altitude of land-surface datum is 960 ft (293 m). Measuring point: Plywood instrument shelf, 2.85 ft (0.87 m) above land-surface datum.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft (7.11 m) below land-surface datum, June 17, 1976; lowest, 27.54 ft (8.39 m), Mar. 5, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	26.29	26.58	--	--	--	27.54	--	26.62	26.29	26.25	26.49	26.75
10	26.33	26.63	--	--	--	--	--	26.55	26.25	26.29	26.54	26.79
15	26.38	--	--	--	--	--	--	26.49	26.24	26.32	26.58	26.84
20	26.43	--	26.93	--	--	--	--	26.44	26.22	26.35	26.62	26.88
25	26.47	--	--	27.26	--	--	26.79	26.39	26.22	26.40	26.66	26.92
EOM	26.53	--	--	--	--	--	26.71	26.33	26.24	26.46	26.71	26.96

WTR YEAR 1981 MAX 26.21 JUN 20, 21, 22, 1981 MIN 27.54 MAR 5, 1981

HILLSDALE COUNTY

415154084315401. Local number, 7S 2W 15BCBA1.
LOCATION.--Lat 41°51'54", long 084°31'54", Hydrologic Unit 04100003, at Trail and Bird Lake Roads 7 mi (11 km) southeast of Hillsdale.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 150 ft (46 m), screened 135 to 150 ft (41 to 46 m).
DATUM.--Altitude of land-surface datum is 1092 ft (333 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--November 1978 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 47.14 ft (14.37 m) below land-surface datum, Sep. 22, 1981; lowest measured, 49.00 ft (14.93 m) Mar. 15, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 9	48.04	DEC 18	48.10	FEB 23	47.89	MAY 22	47.53	AUG 18	47.22	SEP 22	47.14
NOV 18	48.21	JAN 21	48.27	MAR 24	47.90	JUL 13	47.26				

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.
LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi (4.0 km) west of Pittsford on M-43.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in (3.2 cm), depth 20 ft (6 m), screened 17 to 20 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 1,070 ft (326 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.80 ft (2.07 m) below land-surface datum, Feb. 23, 1981; lowest measured, 11.1 ft (3.38 m), Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 9	8.17	DEC 18	7.69	FEB 23	6.80	MAY 22	7.26	AUG 18	7.27	SEP 22	7.24
NOV 18	8.32	JAN 21	8.47	MAR 24	7.78	JUL 13	7.26				

INGHAM COUNTY

424424084340301. Local number, 4N 2W 17ABAA.
LOCATION.--Lat 42°44'24", long 084°34'03", Hydrologic Unit 04050004, at Kirby and Logan Streets, Lansing.
Owner: City of Lansing.
AQUIFER.--Saginaw Formation of Pennsylvania age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 20 in (51 cm), depth 424 ft (129 m).
DATUM.--Land-surface datum is 858.72 ft (261.74 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood shelter base, 0.5 ft (0.2 m) above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--December 1929 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.3 ft (10.5 m) below land-surface datum, Dec., 1929; lowest, 168.3 ft (51.3 m) May 7, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	112.3	112.8	112.0	111.9	--	--	113.6	113.4	113.1	113.5	114.0
10	--	112.7	112.8	112.0	112.1	--	--	113.3	113.5	113.5	113.5	113.6
15	--	112.7	112.5	111.6	112.8	--	--	113.3	113.6	113.5	113.4	113.9
20	--	112.6	113.3	111.7	112.7	--	--	113.4	113.5	113.3	113.7	114.0
25	--	113.0	112.9	111.2	113.2	--	--	113.2	113.4	113.7	113.9	114.4
EOM	112.5	112.4	111.7	111.9	--	113.4	113.4	113.6	113.5	113.8	113.7	114.5

WTR YEAR 1981 MAX 110.8 FEB 25, 1981 MIN 114.5 SEP 22, 23, 24, 28, 29, 30, 1981.

IOSCO COUNTY

442839083312301. Local number, 24N 7E 13ADAD1.
LOCATION.--Lat 44°28'39", long 083°31'23", Hydrologic Unit 04070007, 10 mi (16 km) west of Oscoda.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 69 ft (21 m), screened 54 to 69 ft (16 to 21 m).
DATUM.--Altitude of land-surface datum is 760 ft (232 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.67 ft (9.04 m) below land-surface datum, July 14, 1980; lowest measured, 32.06 ft (9.76 m) Apr. 16, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	30.69	NOV 24	31.07	JAN 20	31.61	MAR 24	32.00	JUN 11	31.22	AUG 10	31.12
31	30.88	DEC 22	31.30	FEB 18	31.85	APR 16	32.06	JUL 13	31.02	SEP 10	31.39

IRON COUNTY

461257088542001. Local number, 44N 37W 14BBCA.
LOCATION.--Lat 46°12'57", long 088°54'20", Hydrologic Unit 04030106, 0.5 mi (0.8 km) south of Elmwood on FFH 16.
Owner: State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).
DATUM.--Altitude of land-surface datum is 1,730 ft (527 m). Measuring point: Top of plywood shelter base, 4.21 ft (1.28 m) above land-surface datum.
PERIOD OF RECORD.--October 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 91.84 ft (27.99 m) below land-surface datum, Oct. 3, 1973; lowest measured, 96.72 ft (29.48 m) Oct. 4, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	92.99	MAR 31	93.32	JUL 14	93.01

JACKSON COUNTY

421435084234801. Local number, 3S 1W 2BDBA.
LOCATION.--Lat 42°14'35", long 084°23'48", Hydrologic Unit 04050004, at end of Hamburg Street, Jackson.
Owner: City of Jackson.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 12 in (30 cm), depth 400 ft (122 m), open bottom.
DATUM.--Altitude of land-surface datum is 935 ft (285 m). Measuring point: Plywood recorder shelf, +4.00 ft (1.22 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--August 1966 to October 1981.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.3 ft (5.9 m) below land-surface datum, Jan. 3, 1971; lowest, 68.8 ft (21.0 m) Jun. 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.70	33.71	35.22	23.07	34.58	35.53	32.16	33.28	38.78	25.09	37.41	--
10	34.95	33.76	34.93	--	34.10	34.91	35.15	33.05	39.18	35.11	35.80	--
15	33.71	34.15	32.70	--	33.58	32.63	37.20	34.50	36.68	38.54	41.15	--
20	32.16	36.19	34.60	32.40	36.16	34.68	32.29	32.31	36.04	37.38	--	--
25	34.06	35.89	26.40	31.20	36.14	35.48	35.16	31.74	38.77	38.99	--	--
EOM	33.84	23.12	23.30	34.05	32.17	32.91	35.19	34.15	35.76	36.17	--	--

WTR YEAR 1981 MAX 18.02 JAN 4, 1981 MIN 45.45 AUG, 1981

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.
LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Crosstown Parkway and Stockbridge Avenue, Kalamazoo.
Owner: City of Kalamazoo
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 137 ft (42 m), screened 134 to 137 ft (41 to 42 m).
DATUM.--Land-surface datum is 764.7 ft (233.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft (0.61 m) above land surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft (1.47 m) below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft (9.47 m) Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.19	8.07	7.77	7.43	7.28	7.34	7.50	7.68	7.90	8.17	8.71	9.34
10	8.19	8.04	7.71	7.40	7.29	7.36	7.53	7.72	7.95	8.24	8.81	9.41
15	8.18	8.03	7.66	7.34	7.30	7.38	7.57	7.75	8.01	8.33	8.92	9.49
20	8.16	7.97	7.63	7.30	7.30	7.41	7.60	7.77	8.05	8.43	9.04	9.58
25	8.15	7.91	7.57	7.29	7.30	7.44	7.63	7.81	8.06	8.51	9.13	9.64
EOM	8.12	7.83	7.49	7.28	7.32	7.47	7.65	7.85	8.11	8.62	9.24	9.70

WTR YEAR 1981 MAX 7.27 JAN 31, 1981 MIN 9.70 SEP 30, 1981

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.
LOCATION.--Lat 42°13'25", long 085°40'48", Hydrologic Unit 04050003, at Kalamazoo Community College.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in (7.6 cm), depth 248 ft (76 m).
DATUM.--Altitude of land-surface is 880 ft (268 m). Measuring point: Top of shelter base, 4.0 ft (1.2 m) above land-surface datum.
PERIOD OF RECORD.--March 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft (+0.91 m) above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft (0.32 m) below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	-0.33	+0.32	+0.44	+0.40	+0.36	+0.30	+0.11	+0.27	+0.15	-0.07	-0.59	-0.26
10	-0.37	+0.33	+0.43	+0.40	+0.45	+0.40	+0.10	+0.32	+0.06	-0.44	-0.58	-0.23
15	-0.42	+0.33	+0.45	+0.34	+0.37	+0.30	+0.07	+0.34	+0.05	-0.42	-0.39	-0.25
20	-0.45	+0.36	+0.42	+0.31	+0.34	+0.44	+0.10	+0.35	+0.04	-0.50	-0.54	+0.02
25	+0.12	+0.35	+0.44	+0.32	+0.32	+0.27	+0.22	+0.32	-0.01	-0.51	-0.39	+0.08
EOM	+0.27	+0.37	+0.42	+0.28	+0.30	+0.15	+0.30	+0.30	-0.04	-0.53	-0.31	+0.27

WTR YEAR 1981 MAX +0.64 MAY 16, 1981 MIN -0.65 AUG 11, 1981

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.
LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi (3.4 km) north of Byron Center and 0.4 mi (0.6 km) west of Byron Center Road.
Owner: City of Wyoming.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 86 ft (26 m).
DATUM.--Land-surface datum is 685.97 ft (209.08 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of shelter base, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Monthly measurements begun August 1978.
PERIOD OF RECORD.--October 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft (2.52 m) below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft (3.93 m) Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	11.02	DEC 22	10.59	MAR 4	10.14	MAY 13	8.56	JUL 21	10.42	AUG 24	11.00
NOV 24	11.15	JAN 26	10.90	APR 6	10.10	JUN 15	9.36				

LAKE COUNTY

440737085483701. Local number, 20N 13W 13ACAC1.
LOCATION.--Lat 44°07'37", long 085°48'37", Hydrologic Unit 04060103, 5 mi (8 km) east of Irons.
Owner: U.S. Geological Survey.
AQUIFER.--Outwash deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 57 ft (17 m), screened 42 to 57 ft (13 to 17 m).
DATUM.--Altitude of land-surface datum is 945 ft (288 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land-surface datum.
PERIOD OF RECORD.--March 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.70 ft (4.48 m) below land-surface datum, July 22, 1980; lowest measured, 17.08 ft (5.21 m) Mar. 14, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 10	15.82	FEB 20	16.05	APR 21	15.83	MAY 19	15.42	JUN 16	15.42	AUG 25	16.32
JAN 21	15.85	MAR 31	15.92								

LEELANAU COUNTY

445020086012201. Local number, 28N 14W 8DDCA1.
LOCATION.--Lat 44°50'20", long 086°01'22", Hydrologic Unit 04060104, 2.5 mi (4.0 km) northeast of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 138 ft (42 m), screened 123 to 138 ft (37 to 42 m).
DATUM.--Altitude of land-surface datum is 750 ft (229 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land surface datum.
PERIOD OF RECORD.--February 1978 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.12 ft (34.48 m) below land-surface datum, Mar. 21, 1980; lowest measured, 113.74 ft (34.67 m), Aug. 25, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	113.35	MAR 4	113.71	MAY 18	113.62	JUN 18	113.71	JUL 30	113.64	AUG 25	113.74
DEC 10	113.20	APR 23	113.42								

LEELANAU COUNTY

445011086031401. Local number, 28N 14W 18BABB1.
LOCATION.--Lat 44°50'11", long 086°03'14", Hydrologic Unit 04060104, 2 mi (3 km) north of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 60 ft (18 m), screened 45 to 60 ft (14 to 18 m).
DATUM.--Altitude of land-surface datum is 625 ft (190 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land-surface datum.
PERIOD OF RECORD.--November 1979 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.08 ft (7.03 m) below land-surface datum, Apr. 23, 1981; lowest, 24.42 ft (7.44 m) Sep. 29, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	23.98	24.00	24.07	24.02	24.10	23.60	23.66	23.14	23.46	23.76	24.09	24.31
10	23.98	24.02	24.07	24.03	24.11	23.54	23.40	23.15	23.53	23.81	24.13	24.32
15	24.00	24.02	24.03	24.02	24.13	23.55	23.25	23.18	23.58	23.87	24.17	24.35
20	23.99	24.02	24.04	24.05	24.06	23.63	23.13	23.24	23.62	23.92	24.20	24.37
25	23.96	24.04	24.03	24.06	23.91	23.73	23.12	23.31	23.67	23.98	24.24	24.39
EOM	23.99	24.03	24.00	24.10	23.77	23.73	23.11	23.41	23.72	24.04	24.27	24.42

WTR YEAR 1981 MAX 23.08 APR 23, 1981 MIN 24.42 SEP 29, 1981

LENAWEE COUNTY

420246084150601. Local number, 5S 1E 12DDBD.

LOCATION.--Lat 42°02'46", long 084°15'06", Hydrologic Unit 04100002, 2 mi (3 km) west of Cambridge Junction on the Onsted State Game Area.

Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 39 ft (12 m), screened 36 to 39 ft (11 to 12 m).

DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.

PERIOD OF RECORD.--December 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.19 ft (4.93 m) below land-surface datum, Apr. 5, 1979; lowest measured, 19.33 ft (5.89 m) Sept. 2, 1971

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 3	17.20	DEC 11	16.86	FEB 20	16.60	APR 27	16.63	JUL 2	16.98	SEP 14	16.88
NOV 6	17.16	JAN 16	17.14	MAR 24	16.87	JUN 5	16.59	AUG 17	17.03		

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.

LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi (3 km) northwest of South Lyon on Twelve Mile Road.

Owner: American Aggregate Corporation.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in (5 cm), depth 29 ft (9 m), 1¼ in (3.2 cm) diameter screen.

DATUM.--Altitude of land-surface datum is 930 ft (283 m). Measuring point: Plywood instrument shelf, 2.50 ft (0.76 m) above land-surface datum.

PERIOD OF RECORD.--April 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft (3.7 m) below land-surface datum, Apr. 22, 1974; lowest, 21.58 ft (6.58 m) Oct. 30, 31, Nov. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	16.31	16.15	16.51	16.61	16.53	15.64	15.47	15.28	15.07	15.08	15.10	15.19
10	16.24	16.31	16.44	16.62	16.52	15.54	15.48	15.23	15.07	15.09	15.14	15.17
15	16.22	16.31	16.48	16.62	16.57	15.51	15.49	15.18	15.08	15.14	15.05	15.14
20	16.13	16.35	16.59	16.62	15.70	15.48	15.39	15.15	15.05	15.09	15.19	15.15
25	16.12	16.38	16.59	16.62	15.69	15.52	15.32	15.10	15.04	15.04	15.29	15.19
EOM	16.15	16.39	16.59	16.58	15.66	15.48	15.32	15.10	15.03	15.04	15.34	15.27

WTR YEAR 1981 MAX 15.03 JUN 25, 1981 MIN 16.62 JAN 10, 1981

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.

LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi (3 km) north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.

Owner: U.S. Forest Service.

AQUIFER.--Manistique Dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).

DATUM.--Altitude of land-surface datum is 650 ft (198 m). Measuring point: Top of shelter floor, 2.3 ft (0.7 m) above land-surface datum.

PERIOD OF RECORD.--June 1956 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft (4.0 m) below land-surface datum, May 11, 1960; lowest, 32.3 ft (9.8 m) Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	28.93	29.35	28.85	28.54	29.52	26.29	24.29	21.49	24.40	25.80	27.91	29.48
10	28.99	29.54	28.58	28.75	29.63	26.50	17.98	22.08	24.63	26.25	28.04	29.56
15	29.16	29.44	28.35	28.87	29.91	26.31	18.57	22.68	24.97	26.62	28.32	29.76
20	29.14	29.25	28.50	29.05	29.59	26.02	19.43	23.29	24.65	26.81	28.69	29.91
25	29.18	29.12	28.45	29.08	26.49	26.00	20.08	23.78	25.18	27.25	29.00	30.10
EOM	29.21	28.68	28.45	29.46	26.38	23.95	20.75	24.40	25.58	27.70	29.22	30.11

WTR YEAR 1981 MAX 17.90 APR 10, 1981 MIN 30.11 SEP 30, 1981

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.
LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi (7.7 km) west of Ishpeming on U.S. Highway 41 and M-28.
Owner: Ely Township.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 72 ft (22 m), screened 68 to 72 ft (19 to 22 m).
DATUM.--Land-surface datum is 1,571.99 ft (479.14 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder base, 3.0 ft (0.9 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft (2.97 m) below land-surface datum, May 13, 1974; lowest, 19.26 ft (5.87 m) Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.16	14.59	15.03	15.50	16.13	16.32	14.80	13.65	13.32	12.93	13.86	14.44
10	14.24	14.75	15.10	15.60	16.22	16.32	14.40	13.04	13.40	13.09	13.88	14.52
15	14.36	14.78	15.14	15.70	16.22	16.36	14.25	13.03	13.34	13.23	13.94	14.67
20	14.43	14.80	15.25	15.77	16.30	16.41	14.21	13.13	12.80	13.39	14.05	14.76
25	14.53	14.89	15.31	15.83	16.32	16.48	14.06	13.21	12.85	13.55	14.17	14.90
EOM	14.59	14.91	15.40	16.04	16.28	16.00	13.78	13.29	12.91	13.74	14.29	14.95

WTR YEAR 1981 MAX 12.76 JUN 24, 1981 MIN 16.49 MAR 27, 1981

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.
LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.
Owner: State Highway Department.
AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordovician age.
WELL CHARACTERISTICS.--Water-table well, diameter 4 in (10 cm), depth 17 ft (5 m), cased.
DATUM.--Altitude of land-surface datum is 800 ft (244 m). Measuring point: Top of 2 in (5 cm) reducing nipple, 1.26 ft (0.38 m) above land-surface datum.
PERIOD OF RECORD.--September 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.47 ft (1.06 m) below land-surface datum, Apr. 12, 1979; lowest measured, 8.62 ft (2.63 m) Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	4.72	FEB 5	5.70	JUN 4	4.82	SEP 24	5.71

MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.
LOCATION.--Lat 41°52'06", long 083°41'44", Hydrologic Unit 04100002, on Teal Road 2 mi (3 km) southeast of Petersburg.
Owner: U.S. Geological Survey.
AQUIFER.--Detroit River Group of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 72 ft (22 m), cased to 53 ft (16 m), open end.
DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 35.39 ft (10.79 m) below land-surface datum, Jul. 2, 1981; lowest measured, 40.55 ft (12.36 m) Nov. 2, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	36.66	JAN 13	37.53	MAR 23	36.01	JUN 2	35.70	AUG 17	37.29	SEP 14	36.30
DEC 8	37.02	FEB 18	37.10	APR 27	35.49	JUL 2	35.39				

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.
LOCATION.--Lat 41°52'35", long 083°41'50", Hydrologic Unit 04100002, 1.5 mi (2.4 km) southeast of Petersburg on Teal Road.
Owner: State Department of Natural Resources
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 17 ft (5 m), screened 14 to 17 ft (4 to 5 m).
DATUM.--Altitude of land-surface datum is 675 ft (206 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft (0.91 m) below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft (2.04 m), Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	4.83	JAN 13	5.41	MAR 23	5.16	JUN 2	4.74	AUG 17	4.91	SEP 14	4.87
DEC 8	5.36	FEB 18	5.59	APR 27	4.87	JUL 2	4.46				

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.
LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi (13 km) northeast of Holton on Holton-Duck Lake Road.
Owner: State Department of Natural Resources
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 1¼ in (3.2 cm), depth 31 ft (9 m), screened 28 to 31 ft (8.5 to 9 m).
DATUM.--Altitude of land-surface datum is 595 ft (181 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.16 ft (+0.05 m) above land-surface datum, May 22, 1974; lowest measured, 4.74 ft (1.44 m) below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 23	1.22	MAR 2	0.37	MAY 28	1.38	AUG 25	3.67

OAKLAND COUNTY

424133083293201. Local number, 3N 8E 3DBAB.
LOCATION.--Lat 42°41'33", long 083°29'32", Hydrologic Unit 04090005, 3 mi (5 km) east of White Lake at White Lake and Teggerdine Roads.
Owner: Huron Clinton Metropolitan Park Authority.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 163 ft (50 m), screened 143 to 163 ft (44 to 50 m).
DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--July 1972 to October 1981.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.20 ft (2.19 m) below land-surface datum, May 7, 1976; lowest, 11.16 ft (3.40 m) Sept. 12, 1978.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.02	10.11	--	10.24	10.32	9.46	9.52	9.22	9.37	--	--	--
10	10.06	10.16	--	10.27	10.34	9.50	9.53	9.24	9.44	--	--	--
15	10.05	10.15	9.90	10.27	10.27	9.55	9.22	8.97	--	10.08	--	10.02
20	10.04	10.17	10.12	10.29	9.63	9.64	9.26	9.08	--	--	--	--
25	10.01	--	10.15	10.26	9.36	9.64	9.16	9.16	--	--	--	--
EOM	10.03	--	10.14	10.34	9.34	9.48	9.12	9.30	--	--	--	--

WTR YEAR 1981 MAX 8.95 MAY 15, 1981 MIN 10.74 AUG 1981

OCEANA COUNTY

433133086082601. Local number, 13N 15W 18AAAA.
LOCATION.--Lat 43°31'33", long 086°08'26", Hydrologic Unit 04060101, approximately 6 mi (10 km) southwest of Hesperia.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 79 ft (24 m), screened 69 to 79 ft (21 to 24 m).
DATUM.--Altitude of land-surface datum is 703 ft (214 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
REMARKS.--Continuous recorder installed, July 10, 1979.
PERIOD OF RECORD.--August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.10 ft (11.00 m) below land-surface datum, May 25, 1978; lowest measured, 40.37 ft. (12.30 m) Apr. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.97	39.05	39.22	39.38	39.44	39.48	39.40	39.01	38.67	38.48	38.69	39.03
10	38.94	39.14	39.27	39.39	39.44	39.50	39.35	38.94	38.63	38.49	38.75	39.07
15	38.95	39.15	39.27	39.38	39.45	39.48	39.33	38.87	38.60	38.49	38.80	39.14
20	38.94	39.16	39.33	39.40	39.46	39.48	39.23	38.82	38.57	38.48	38.86	39.19
25	38.95	39.21	39.34	39.38	39.49	39.50	39.16	38.77	38.54	38.55	38.91	39.25
EOM	39.00	39.19	39.32	39.42	39.46	39.43	39.08	38.72	38.53	38.64	38.96	39.30

WTR YEAR 1981 MAX 38.46 JUL 13, 1981 MIN 39.52 MAR 8, 1981

OGEMAW COUNTY

442514084164702. Local number, 23N 1E 2BAAA.
LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi (13 km) west of Rose City on south side of Rose City Road.
Owner: Ogemaw County Road Commission.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.8 cm), depth 20 ft (6 m).
DATUM.--Altitude of land-surface datum is 1,265 ft (386 m). Measuring point: Top of casing, 2.30 ft (0.70 m) above land-surface datum.
PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft (2.32 m) below land-surface datum, Apr. 13, 1976; lowest measured, 13.6 ft (4.1 m) December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	10.72	JAN 19	12.75	APR 20	10.24	JUL 2	10.03

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.
LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft (99 m) south of M-64, 1.5 mi (2.4 km) east of Silver City.
Owner: State Corrections Department.
AQUIFER.--Freda Sandstone of Keweenawan age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 100 ft (30 m), cased to 32 ft (10 m).
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--October 1958 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft (2.50 m) below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft (6.65 m) Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	11.20	FEB 4	11.48	JUN 10	9.67	AUG 20	11.86

OTSEGO COUNTY

445920084425801. Local number, 30N 3W 19ABBB.
LOCATION.--Lat 44°59'20", long 084°42'58", Hydrologic Unit 04070007, on Old Alba Road 3 mi (5 km) southwest of Gaylord.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 87 ft (27 km), screened 72 to 87 ft (22 to 27 km).
DATUM.--Altitude of land-surface datum is 1307 ft (399 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.69 ft (9.35 m) below land-surface datum, July 24, 1979; lowest measured, 34.24 ft (10.44 m) Mar. 26, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	33.07	DEC 23	33.54	MAR 26	34.24	JUN 1	33.45	AUG 11	33.83	SEP 8	34.07
DEC 4	33.38	FEB 13	34.11	APR 29	33.76	JUL 8	33.50				

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.
LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi (3 km) west and 1 mi (2 km) north of Posen.
Owner: A. Styma.
AQUIFER.--Traverse Group.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 61 ft (19 m).
DATUM.--Altitude of land-surface datum is 815 ft (248 m). Measuring point: Top of casing, 0.5 ft (0.2 m) above land-surface datum.
PERIOD OF RECORD.--December 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.10 ft (1.55 m) below land-surface datum, Mar. 2, 1979; lowest measured, 16.83 ft (5.13 m) Mar. 5, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	14.44	FEB 17	15.52	APR 13	8.37	JUL 8	11.29

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.
LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi (3 km) south of Roscommon and 0.5 mi (0.8 km) east of highway M-18 on highway M-103.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in (20 cm), depth 14 ft (4 m), open bottom.
DATUM.--Land-surface datum is 1,145.30 ft (349.09 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--December 1934 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft (0.70 m) below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft (1.90 m) Dec. 6-11, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	4.96	5.05	5.03	4.99	5.17	4.61	4.21	3.65	4.05	4.49	4.92	5.10
10	5.00	5.06	4.97	5.02	5.19	4.56	4.10	3.69	4.15	4.56	4.90	5.15
15	5.02	5.05	4.93	5.05	5.22	4.51	3.98	3.71	4.24	4.65	4.97	5.18
20	5.01	5.01	4.94	5.09	5.03	4.49	3.93	3.80	4.33	4.74	5.05	5.22
25	5.02	5.01	4.95	5.11	4.85	4.48	3.94	3.86	4.36	4.81	5.07	5.25
EOM	5.03	5.02	4.97	5.16	4.73	4.34	3.73	3.97	4.40	4.87	5.07	5.26

WTR YEAR 1981 MAX 3.63 APR 4, 1981 MIN 5.26 SEP 28, 1981

SAGINAW COUNTY

431457084194401. Local number, 10N 1E 22DADA1.
LOCATION.--Lat 43°14'57", long 084°19'44", Hydrologic Unit 04080203, west side of Merrill Road 0.35 mi (0.56 m) north of Marion Springs.
Owner: U.S. Geological Survey
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 210 ft (64 m), cased to 170 ft (52 m).
DATUM.--Altitude of land-surface datum is 657 ft (200 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--December 1977 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.93 ft (2.42 m) below land-surface datum, Feb. 10, 1981; lowest 10.00 ft (3.05 m) Sept. 14, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.79	8.46	8.36	8.29	8.26	--	--	8.26	8.33	8.49	8.74	8.83
10	8.71	8.53	8.30	8.22	8.21	--	--	8.27	8.39	8.63	8.81	8.78
15	8.67	8.48	8.26	8.13	8.32	--	--	8.17	8.38	8.68	8.78	8.89
20	8.56	8.44	8.43	8.19	8.23	--	--	8.28	8.47	8.63	8.90	8.81
25	8.48	8.47	8.31	8.10	--	--	8.22	8.24	8.48	8.80	9.00	8.90
EOM	8.48	8.26	8.12	8.31	--	--	8.19	8.37	8.56	8.75	8.83	8.76

WTR YEAR 1981 MAX 7.93 FEB 10, 1981 MIN 9.00 AUG 25, 1981

SANILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.
LOCATION.--Lat 43°34'39", long 082°52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi (5 km) east and .75 mi (1.21 km) north of Argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in (15 cm), depth 130 ft (40 m), cased with plastic pipe to 48 ft (15 m), open bottom.
DATUM.--Altitude of land-surface datum is 805 ft (245 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--October 15, 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.66 ft (5.38 m) below land-surface datum, Apr. 6, 1978; lowest 22.71 ft (6.92 m) Nov. 20, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	21.11	21.03	20.87	20.64	20.71	18.90	19.03	18.30	18.85	19.74	20.57	18.75
10	21.11	21.08	20.32	20.66	20.74	18.92	18.66	18.45	19.18	20.08	20.38	18.83
15	21.11	21.05	20.40	--	20.57	18.95	18.50	17.80	19.22	20.30	20.41	19.18
20	20.94	21.05	20.57	--	19.54	19.06	18.60	18.06	19.41	20.34	20.55	18.39
25	20.91	21.07	20.62	--	19.00	19.08	18.45	18.24	19.46	20.60	20.74	18.34
EOM	20.98	21.03	20.57	20.70	18.81	18.95	18.04	18.65	19.71	20.42	19.96	18.09

WTR YEAR 1981 MAX 17.68 MAY 12, 1981 MIN 21.30 OCT 2, 1980

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.
LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge.
Owner: U.S. Fish and Wildlife Service.
AQUIFER.--Limestones of Upper Ordovician age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in (10 cm), depth 151 ft (46 m), cased to 65 ft (20 m).
DATUM.--Altitude of land-surface datum is 710 ft (216 m). Measuring point: Top of casing, 3.60 ft (1.10 m) below land-surface datum.
PERIOD OF RECORD.--June 1952 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft (1.41 m) below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft (1.98 m) Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.76	5.63	5.58	5.35	5.22	5.19	5.14	5.37	5.50	5.43	5.65	5.85
10	5.75	5.67	5.54	5.29	5.23	5.22	5.32	5.33	5.45	5.47	5.68	5.84
15	5.76	5.54	5.52	5.25	5.25	5.20	5.38	5.35	5.33	5.53	5.72	5.86
20	5.66	5.52	5.47	5.26	5.21	5.19	5.34	5.43	5.37	5.56	5.75	5.88
25	5.58	5.56	5.40	5.25	5.24	5.25	5.37	5.44	5.40	5.59	5.78	5.94
EOM	5.60	5.52	5.39	5.28	5.20	5.16	5.31	5.45	5.42	5.62	5.82	5.94

WTR YEAR 1981 MAX 4.94 APR 5, 1981 MIN 5.96 SEP 24, 1981

VAN BUREN COUNTY

421435085591001. Local number, 3S 14W 6BAAD.
LOCATION.--Lat 42°14'35", long 085°59'10", Hydrologic Unit 04050001, 5 mi (8 km) northwest of Paw Paw at the southwest corner of 45th and 48th Streets.
Owner: Rex Martin
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1½ in (3.8 cm), depth 59 ft (18 m), screened 56 to 59 ft (17 to 18 m).
DATUM.--Altitude of land-surface datum is 740 ft (226 m). Measuring point: Top of casing, 0.5 ft (.2 m) above land-surface datum.
PERIOD OF RECORD.--May 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 37.22 ft (11.34 m) below land-surface datum, May 30, 1974; lowest measured, 43.28 ft (13.19 m) Nov. 20, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 9	38.89	JAN 29	39.33	MAR 27	38.38	MAY 29	37.90	JUL 16	38.48	AUG 18	39.12
DEC 15	38.96	FEB 27	38.44	APR 29	38.11	JUN 30	38.10	29	38.79	SEP 29	39.64

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.
LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.
Owner: Ypsilanti Township.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 80 ft (24 m), screened 77 to 80 ft (23 to 24 m).
DATUM.--Land-surface datum is 665.65 ft (202.86 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 3.00 ft (0.91 m) above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft (1.76 m) below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft (6.91 m) Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.70	12.83	14.39	14.84	14.89	13.62	14.32	--	13.01	12.65	12.68	12.56
10	12.62	13.60	14.36	15.07	14.76	13.81	14.39	--	12.94	12.87	12.76	12.63
15	12.63	13.98	14.28	14.83	14.77	13.98	14.06	--	12.77	12.79	--	12.78
20	12.66	14.25	14.67	14.74	13.74	14.14	--	--	12.71	12.68	12.74	12.70
25	12.55	14.46	14.78	14.65	13.25	14.31	--	--	12.68	12.82	12.85	12.67
EOM	12.71	14.40	14.62	14.83	13.25	14.19	--	--	12.73	12.72	12.70	12.65

WTR YEAR 1981 MAX 12.46 OCT 11, 1981 MIN 15.07 JAN 10, 1981

Temperatures of ground water are measured as part of a state-wide water resource investigation in cooperation with Michigan Department of Natural Resources. The purpose of these measurements is to determine the natural ground-water temperature of selected points throughout the State. These data can be used to estimate ground-water temperatures in many areas in the State. Measurements of temperature were made by means of "lazy" thermometers (Heath, 1964).

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
ALGER COUNTY, 45N 19W 25BDCD1 (LAT 46°16'08", LONG 86°37'38") DEPTH 66 FT (20 m)					
OCT 14, 1980	9.5	APR 8 . . .	7.5	JUL 9 . . .	7.0
JAN 13, 1981	7.5				
DICKINSON COUNTY, 43N 28W 32ADAB1 (LAT 46°04'59", LONG 87°49'37") DEPTH 31 ft (9 m)					
OCT 21, 1980	7.0	MAR 4 . . .	7.0	JUL 2 . . .	6.0
NOV 12 . . .	7.5	APR 16 . . .	6.5	AUG 6	6.0
DEC 18 . . .	7.5	MAY 27 . . .	6.0	SEP 2 . . .	6.5
JAN 21, 1981	7.5				
LENAWEE COUNTY, 5S 1E 12DDBD1 (LAT 42°02'46", LONG 84°15'06") DEPTH 39 ft (12 m)					
OCT 3, 1980	9.5	FEB 20 . . .	9.5	JUL 28 . . .	8.5
NOV 6 . . .	9.5	MAR 24 . . .	9.5	AUG 17 . . .	9.0
DEC 11 . . .	9.5	APR 27 . . .	9.0	SEP 14 . . .	9.5
JAN 16, 1981	9.5	JUN 5 . . .	8.5		
MENOMINEE COUNTY, 37N 26W 19DADA1 (LAT 45°35'00", LONG 87°33'15") DEPTH 17 ft (5 m)					
OCT 14, 1980	10.5	JUN 4 . . .	7.0	SEP 24 . . .	11.5
FEB 5, 1981	7.0				
MUSKEGON COUNTY, 11N 15W 34ADDD1 (LAT 43°18'06", LONG 86°04'44") DEPTH 31 ft (9 m)					
DEC 23, 1980	8.0	MAY 28 . . .	9.0	AUG 25 . . .	9.5
MAR 2, 1981	7.5				
OAKLAND COUNTY, 5N 8E 8ACAC1 (LAT 42°51'16", LONG 83°32'15") DEPTH 42 ft (13 m)					
OCT 7, 1980	9.0	FEB 27 . . .	8.5	JUL 16 . . .	9.0
NOV 10 . . .	8.5	APR 2 . . .	9.5	AUG 18 . . .	9.5
DEC 18 . . .	9.0	MAY 5 . . .	9.0	SEP 22 . . .	9.0
JAN 19, 1981	9.0	JUN 9 . . .	9.0		
ONTONAGON COUNTY, 46N 38W 30ADDD1 (LAT 46°21'18", LONG 89°05'43") DEPTH 50 ft (15 m)					
OCT 8, 1980	7.0	MAY 8 . . .	7.0	AUG 18 . . .	8.5
NOV 14 . . .	7.0	JUN 9 . . .	5.0	SEP 24 . . .	8.0
FEB 3, 1981	7.0	JUL 14 . . .	6.0		

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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons